COOP'S SATELLITE DIGEST

NOVEMBER 1981

Birth of a legend

National Microtech, Inc. introduces Apollo™ X9 Satellite Antenna.

National Microtech, Inc. continues to sell more home satellite antenna systems than anyone in the world. Microtech's new Apollo™ is so far advanced over our competition-in features, performance, and cost- that we feel Apollo™ is destined to become a legend in the satellite industry. If you are interested in buying or selling Apollo™ systems, give us a call today. Remember, no one sells the Apollo™ but Microtech dealers and distributors. See the legend today.

DEALER PRICES

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10 Units	$1195
100 Units	$1095

Optional remote satellite finder $495 wholesale dealer price.

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COOP'S SATELLITE DIGEST T1-11/81

COOP'S COMMENT ON TECHNOLOGY

BIRTH OF EUROPEAN HOME TERMINALS

English TVRO experimenter Steve Birkill started home satellite terminals in Europe. In many ways, he began a technology which Americans and Canadians would later embrace. His reception of an experimental ATS-6 satellite, on loan to India (the world's first DBS experiment) back in 1976, pre-dates all but the earliest work here in North America.

We brought Birkill to the US in 1978, to attend a cable television conference we put on to demonstrate the ability to uplink from a portable site programming created for a special interest group.

Birkill began writing for our old **CATJ** publication shortly after that; something he continues to do today even though we sold **CATJ** in the late spring of 1979. He has been telling people how to do satellite terminal bits and pieces properly, and economically, ever since.

For all of this five year period there has been virtually no satellite "industry" in Europe; at least not the type which attracts the kind of do-it-yourself spirit which we have seen in North America. In 1976, Birkill's 8 foot terminal was the only one in Europe. Today, a long five years later, there may be a dozen additional terminals. That is a pretty slow growth cycle.

Steve Birkill is leaving the UK sometime in the next 30 to 60 days. He is coming to the USA to take up a position with a manufacturer of TVRO terminal systems. He feels he can wait no longer for a TVRO industry to get started in Europe; or more specifically, the United Kingdom.

As often happens in life, Birkill's adventure in the US is starting at just about the same time as Europe is finally discovering "private" terminal systems. The problem has been programming sources, not a lack of technologists.

Most European countries have very tightly controlled media outlets. In more than half these countries, the primary television and radio systems are owned and operated by the government. History has built into the media systems there a fear of allowing anything on the "air" that does not have the stamp of government approval attached. Satellites, which cover whole continents, scare these regulators to death.

The Dutch have been an exception to this rule. While Dutch television and radio is tightly controlled by government, Dutch entrepreneurs have been allowed to build extensive (even by American standards) cable television systems bringing in programs from the UK, Germany, France, and other nearby countries. Backing up these systems are microwave networks that carry non-Dutch TV signals all over the country. And now the Dutch have satellite TV. A young man from Sweden, who has attended a couple of our past SPTS events, has worked out an arrangement with the Dutch cable TV firms to provide reception into Dutch homes from Ghorizont; the Russian bird which on occasion has as many as five TV channels operating onto a spotbeam that boresights on Europe.

Here in North America, there is only one Russian Ghorizont channel (found in the TR9 position on your 24 channel receiver) which is "strong" all of the time. In Europe, Moscow 1 and 3 (two of the four national TV services in Russia) plus up to three other non-Russian TV channels are strong. All five are now finding their way into Dutch cable homes; hundreds of thousands of Dutch cable homes.

Flushed with success, the Dutch experiment is already growing to bring in French Antenne 2 and British ITV programs to Holland via the OTS-2 experimental 12 GHz satellite. An additional Ghorizont system, for Ghorizont 3 at 53 east, is under construction. It would provide yet additional (up to 5) Russian and European TV services to Dutch cable viewers.

Naturally, in all of this, there are legal obstacles ahead. Dutch law allows importation of non-Dutch signals, without regard for how they get into Holland, as long as the cable operator does not insert commercials or allow foreign commercials to "play through".

Perhaps the most significant factor to emerge here is that the Dutch experiment proves that "it can be done". Publicity, for that fact, is bound to create ever widening demand for technology and equipment, currently coming from the leader in this field; the United States and Canadian home satellite terminal industries.

OUR COVER

The "sun is setting" on the long saga of F1; the cable TV bird that has served us all so well for the full history of the home terminal industry. What will F3R bring to us? The future is bright indeed!

CSD TECHNOLOGY

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NOISE FOR ANTENNA TESTS

THE NOISE SOURCE

A few days each year, once in the spring and once in the fall, each satellite receiving location has its own opportunity to "prove" the integrity of a polar mounting tracking system. The sun offers you that opportunity.

As most are aware, the sun is a source of not only our life but broad "band" radio frequency noise as well. Buried inside of the sun is a super power "noise generator" which literally transmits "white noise" over a wide-wide spectrum of frequencies. Our 3.7 to 4.2 GHz frequency range is one of those frequency "blocks" included.

Having the sun in the sky has proved to be useful for many a would be antenna builder or installer. Regardless of where the sun may be in the sky, if you were to crank your antenna elevation and azimuth so that you might place the antenna "in space" on a boresight just ahead of where the sun is at the moment, you can observe the "passage" of the sun through your antenna boresight. This observation of the sun's solar generated noise is like having an almost perfect antenna "test range". If you can devise a way to record, on paper, the passage of the sun's noise, through your antenna's pattern. A CATV field strength meter, attached to your 70 MHz IF output on your receiver, and connected to Heath or other inexpensive "chart recorder", will give you hard proof of the antenna's pattern.

This is a pretty exotic exercise for most of us, and since the antenna's pattern is not that in-question (usually) anyhow, there is probably little interest in this exercise. There is an exercise those with polar mounts can perform, however, which is more closely associated to the day to day operation of the satellite terminal. And that is to use the sun, during the twice-annual solar / satellite alignment period, to plot and check on the trueness of your polar mount.

A properly aligned polar mount will track the satellite belt from your eastern horizon to western horizon. And at all points in between. As most are well aware, the satellite belt from any location is an "**arc**" in the sky, not a straight line. And by the coincidences of natural physics, the satellite arc in the sky is going to align, almost precisely, with the pathway of the sun across the sky (from east to west) on at least two occasions each year.

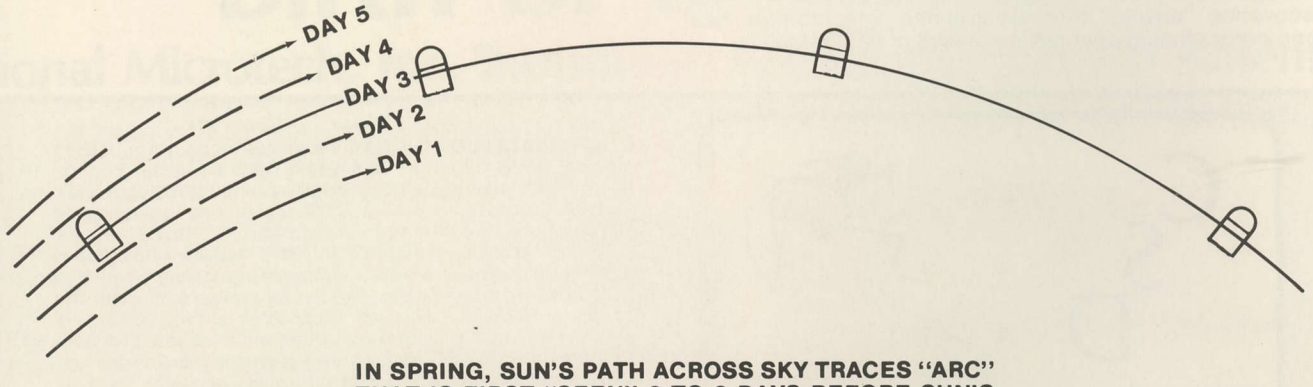
You will recall that the sun appears to shift to our more northern sky in the summer and conversely to our more southern sky in the winter. This applies to northern hemisphere readers, of course. The earth is not precisely "square" with the universe; it tilts by a considerable amount. And it is this tilt combined with the earth's rotation around the sun during our earth-year that creates our seasons.

Thus the sun's position, in our sky today, is not where the sun will be tomorrow. The movement from day to day is slight, but it is constant. We will take advantage of this fact as we use the sun's solar noise generator to prove (or dis-prove) the accuracy of our polar mount tracking system.

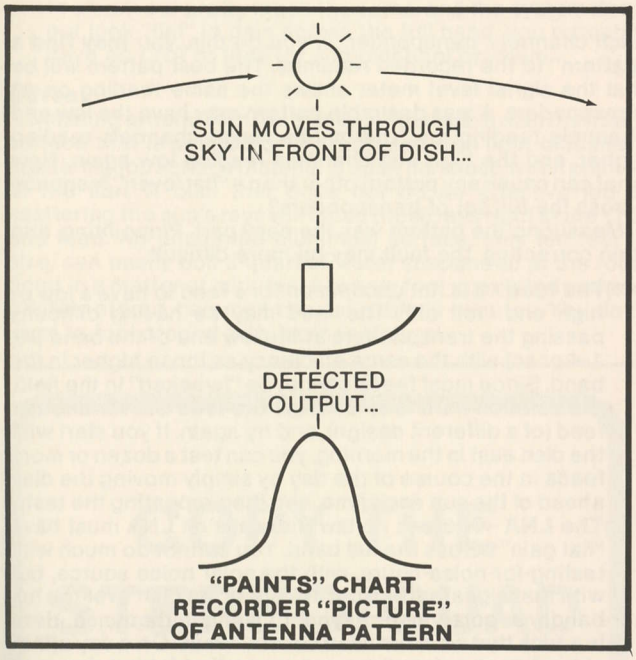
The system is exceedingly simple and it requires nothing more than a polar mount type tracking antenna, and, a receiver with some reasonably accurate system for detecting changes in signal strength. Any receiver with a responsive signal level meter will do, although those with highly sensitive meter circuits (Washburn / Earth Terminals, AVCOM) will find the testing more precise.

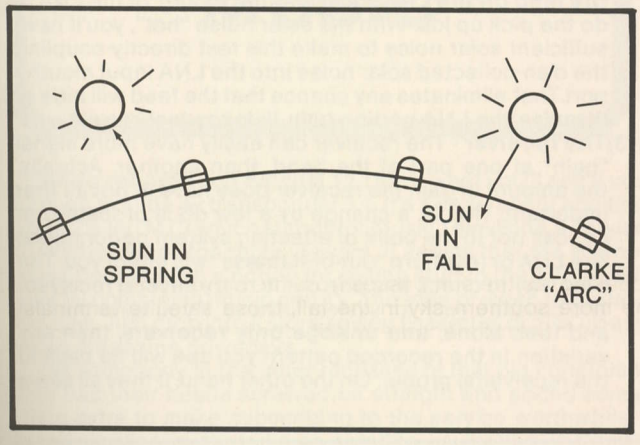
Here is how it works. At each location there are a few days each fall, and each spring, when the Sun's path through the sky will be very close to, or exactly the same as, the Clarke orbit belt in your sky. As the sun rises in your east and traces its path through the sky for those days, you can simply follow the sun with your antenna during the course of the day. The days we are talking about are of course the so-called "solar outage" dates when the sun's noise source may actually cover up (as in override) the satellite signals. Generally speaking, as the sun passes from the more northern sky to the more southern sky in the fall, those satellite terminals located in the more southerly latitudes see the satellite / solar alignment first. Then, as winter comes on the solar outage arc or line moves north, finally reaching the northern edge of the USA around the end of October.

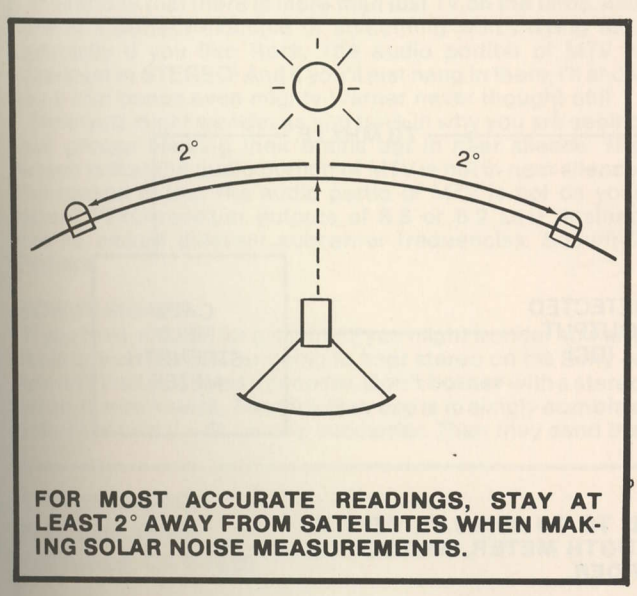
The process repeats in the spring as the sun moves from the southern sky to the northern sky. Now the more northern terminals see it first, and those to the south see it last.



IN SPRING, SUN'S PATH ACROSS SKY TRACES "ARC" THAT IS FIRST "SEEN" 2 TO 3 DAYS BEFORE SUN'S PATH AND GEO-STATIONARY ARC COINCIDE.







Most 10 to 20 foot terminals will have four to six days of solar signal present. The first and last day, the sun's noise will appear on the screen as a **slight increase** in the sparklie level. There will be a peak day, in the middle, when the sun's solar noise will totally drown out the satellite signals. This happens because the sun's noise is a very wide band source, and the noise arriving from the sun at your terminal is almost exactly (to 1.0 dB, higher) the **same signal level** as the satellite. The noise "wins out" and you lose the satellite pictures into the solar noise for between 3 and 8 minutes time.

Given these facts, how do you use this information to check on the geo-stationary arc tracking ability of your polar mounted antenna? And is there a useful "trick" here for other types of mounts?

First you determine when the solar outage will hit your latitude. Remember, it starts in the south and moves north in the fall, and starts in the north and moves south in the spring. As a rough guide, it will be at latitude 20 around the 26th-30th of September and again around the middle of April. It moves north (or south) by approximately one quarter of one degree in **earth latitude** per day. However, because it is off at an angle in your sky, the amount of movement your antenna sees from day to day will typically be **greater than** this.

A ten foot dish, with a beamwidth of 1.8 degrees, will "see" the satellite noise source for a longer period of time than will a 20 foot dish, with a beamwidth of less than 1 degree. Why? Because the wider the beamwidth, the greater the expanse of sky that is "taken in" by that beamwidth. In effect, smaller dishes have a wider "look angle" in the sky than larger dishes.

Therefore, even if you are not certain when the solar noise outage will peak in your area, if you know approximately when to start looking for it, you can see it coming a few days in advance of the actual peak day. If your antenna feed is a prime focus feed, the sun will cast a feed/LNA shadow on the surface of the dish. As the solar alignment comes closer and closer to the peak day, that shadow will crawl closer and closer to the exact center of your dish. On the peak day, when the sun is exactly behind your satellite, the shadow cast by the feed/LNA at the focus point will be directly onto the center of the dish surface.

So you see the solar outage coming. Then what?

If you can see the sun's noise effect on your favorite satellite, you can also see its effects on other satellites. If you are looking at F1, and see the creeping-in of noise late in the afternoon, that same day had you been looking over at Westar 3 you would have seen the same noise; only **earlier** in the day.

And that should suggest using the sun as a "moving satellite in the sky" to check out your dish tracking system.

The tools on hand are simple enough:

1) In the morning, bring your dish around to the east; as far as it will go. Assuming you got east **before** the sun got out in front of the dish, visually check for the shadow being cast on the dish surface by the sun as it moves directly in front of the dish boresight. If your TVRO receiver has a signal level meter, the sun's noise should be very even across all of the transponders. There is a sub-check you can do here, which we will discuss shortly.

2) If you start on a day before the peak solar alignment, you'll get a sun noise level that is lower than it will be in a day or two. Whatever the level is, write it down in a notebook.

3) Now move the antenna westerly, and stop it at some convenient location. Wait for the sun to catch up to it, and then record the solar noise levels one more time. How do the two sets of numbers compare?

4) You keep this up for the course of the day, making checks every ten degrees or so through the sky. It is better to avoid actual satellites (**by a wide margin**) than to stop dead on satellites, since on non-peak days you'll see (by eye) the effects of the solar noise, but it will not register "true" on your meter as long as the satellite video signal is

stronger than the solar noise.

At the end of the first day, carefully study your numbers. We count on the sun being a constant source of noise through the day. The numbers you recorded should also be constant. But hey, what is this? For a part of your arc the numbers are lower (or higher) than the balance of the arc. What does this mean?

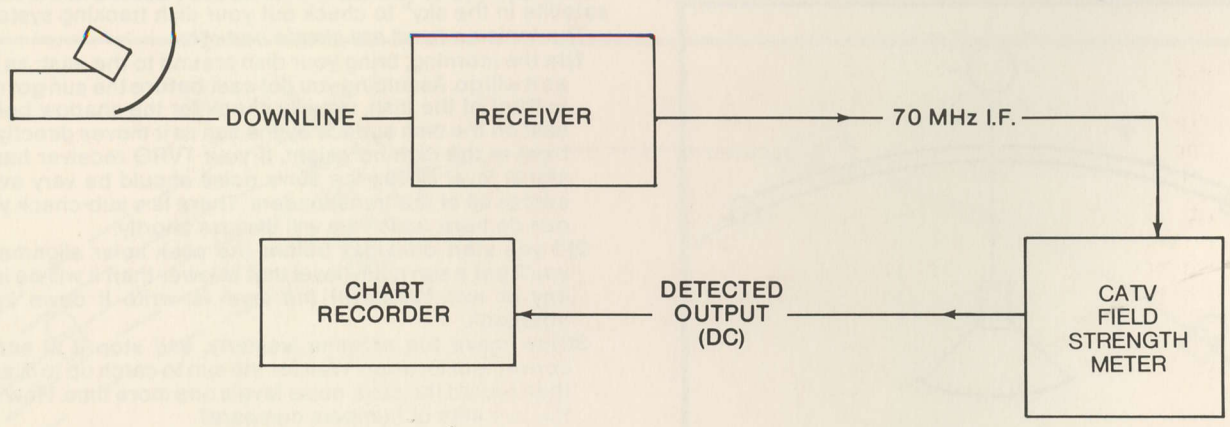
Simply that your dish is not tracking properly (or perfectly) in **that part** of the arc. The sun is still there, where it should be, but your dish is low (or high) on the sun. And by being low or high, it is getting either less sun noise, or more sun noise. **That** is what you want to know; that the dish is not tracking properly!

If you start out early in the four to six day sequence with this test, you can then proceed to make small changes in your polar mounting mechanism, from day to day, to try to correct the "out of true" condition. What you want, when you are satisfied that the dish is tracking properly (i.e. perfectly), is the **same** signal level readings at **each** "check point in the sky"; for the same date.

We said there was a sub-check you can do with this routine. This involves verifying the performance of your LNA, feed and receiver, across the full 3.7 to 4.2 GHz bandwidth. If the sun's noise source is uniform (it is), you should be able to spin through the dial when the sun is out there in front of the antenna and record the indicated signal level from the sun on each channel / transponder. If you do this, you **may find** a "pattern" to the recorded readings. The best pattern will be that the signal level meter shows the same reading on all transponders. A less desirable pattern may have the low end channels reading low, the middle range channels reading higher, and the high end channels reading low again. Now what can cause any pattern other than a "flat/even" response across the full set of transponders?

Measuring the pattern was the easy part. Pinpointing, and then correcting, the fault may be more difficult.

1) **The feed** - It is not uncommon for a feed to have a low or high end "roll off". The feed may be having difficulty passing the transponders at the low end of the band (i.e. 1-4 or so) with the same efficiency as those higher in the band. Since most feeds cannot be "tweeked" in the field, the solution here is to **change** the feed out for another feed (of a different design), and try again. If you start with the dish east in the morning, you can test a dozen or more feeds in the course of the day by simply moving the dish ahead of the sun each time, and then repeating the tests.
2) **The LNA** - There is no law that says an LNA must have "flat gain" across the full band. You cannot do much with testing-for-noise-figure, with the solar noise source, but with that signal spread out in front of the dish over the full band, you surely can check for LNA gain response. Here is a trick that we have used several times. On a day either side of peak solar alignment, or on that fabled day, **pull the feed off the LNA** and allow the "mouth" of the LNA to do the pick up job. With the solar noise "hot", you'll have sufficient solar noise to make this test directly-coupling the dish-collected solar noise into the LNA input mouth / port. That eliminates any chance that the feed will hide or disguise the LNA portion gain flatness test results.
3) **The receiver** - The receiver can easily have more signal "gain" at one part of the band, than another. Actually, the amount of gain the receiver does have is **not** all **that** important. That is, a change by a few dB is probably not critical; not to the point of effecting system performance like LNA or feedhorn "out-of-flatness" will effect you. The best way to check this one out is to try several receivers and compare each for system flatness. If you leave the LNA and feed alone, **and change only receivers**, then any variation in the recorded pattern you see will tie back to the receiver(s) proper. On the other hand, if they all seem



4 GHz SIGNAL IS CONVERTED TO 70 MHz I.F., DETECTED ON CATV FIELD STRENGTH METER, AND DC OUTPUT DRIVES CHART RECORDER.

to check out pretty much the same, and the system does not look "flat" in gain across the full band, you probably have an LNA or feed (or combination) problem.

Caveat

Messing around with the sun is dangerous. A dish that has a surface that is painted or impregnated with light diffusing / scattering top surface material is quite harmless, when pointed at the sun. A dish that does not do an effective job of scattering the sun's rays will focus those rays right at the LNA and feed. An unpainted aluminum surface, only ten feet in size, can easily boil a quart of water suspended at the focal point in a matter of minutes. A twenty foot unpainted surface, brightly attired, can melt coaxial cable in minutes. You don't want to fool around with Mother Nature!

COPY THE STEREO/QUAD MUSIC

"Video records" on Satcom 1? That's what you'll see if you happen to slide by transponder 11. It's a very recent addition and is called MTV which stands for Music Television, a service of Warner Amex for cable viewers. It seems that the Warner Amex people have a notion for selling stuff to the 18-34 year olds by combining music and TV. The idea of video records is not new. Just drop into a store selling cassettes or pick up any video magazine nowadays.

But somebody in the inner recesses of that big conglomerate had their heads screwed on straight and added something extra to make subscribing to the service worthwhile. I often mention in my talks on satellite navigation at Coop's Conventions that there is more than just TV on the birds. And here is a perfect example of something worth trying for... especially if you like Rock. The audio portion of MTV is broadcast in STEREO! And if you'll just hang in there, I'll show you a real bonus even mighty Warner never thought of!!!

Now you might wonder as you tune-in why you are seeing rock groups blasting their brains out in near silence. The reason is that the audio portion of MTV is not in near silence. The reason is that the audio portio of MTV is not on your typical TVRO receiver outputs of 6.8 or 6.2 MHz. Instead they've picked different subcarrier frequencies. Security? Perhaps.

HOW IT WORKS

If you think about it for a moment, you might wonder how any cable subscriber is ever going to hear stereo on his Sony or Advent? Well, you need a decoder. **Don't bother** with a stereo setup. **It won't work.** The trick they use is to simply **combine** both channels (L+R) on one subcarrier. Then they send the

STEVEN GIBSON
P. O. BOX 38386
Hollywood, CA 90038

difference between both channels (L-R) on the other subcarrier. Better security? Nope. In fact it makes a lot of sense because many cable companies are not yet ready to rent stereo decoders to their subscribers and they still need a mono feed (L+R) to their cable system.

You can hear the **sum** channel or L+R on a **6.6 MHz** subcarrier and the **difference** or L-R on **5.8 MHz**. Then all you need to do is a little addition and subtraction with the electrics and viola...they separate into left and right. How's that? Well, if you add the L+R signal to the L-R signal the "+R" and the "-R" cancel leaving just L...or 2L if you wanna be technical 'bout it. Likewise, if you subtract L+R from L-R you get just 2R. Okay, how do we do this easily? The secret to all the addition and subtraction is a matrix, which is a short and fancy way of saying "2 op-amps from Radio Shack".

Now before you rip the top off your receiver and start tweaking, you should consider an option. There is another way. Build 2 more sound sections and whatever else is necessary into a separate box and spare your receiver. Until someone comes along with a box like this or builds it into a receiver, this may be your best option. Don't worry if you are new to electronics. I've found an easy way for you to build this gadget.

MUSIC BOX BONUS...

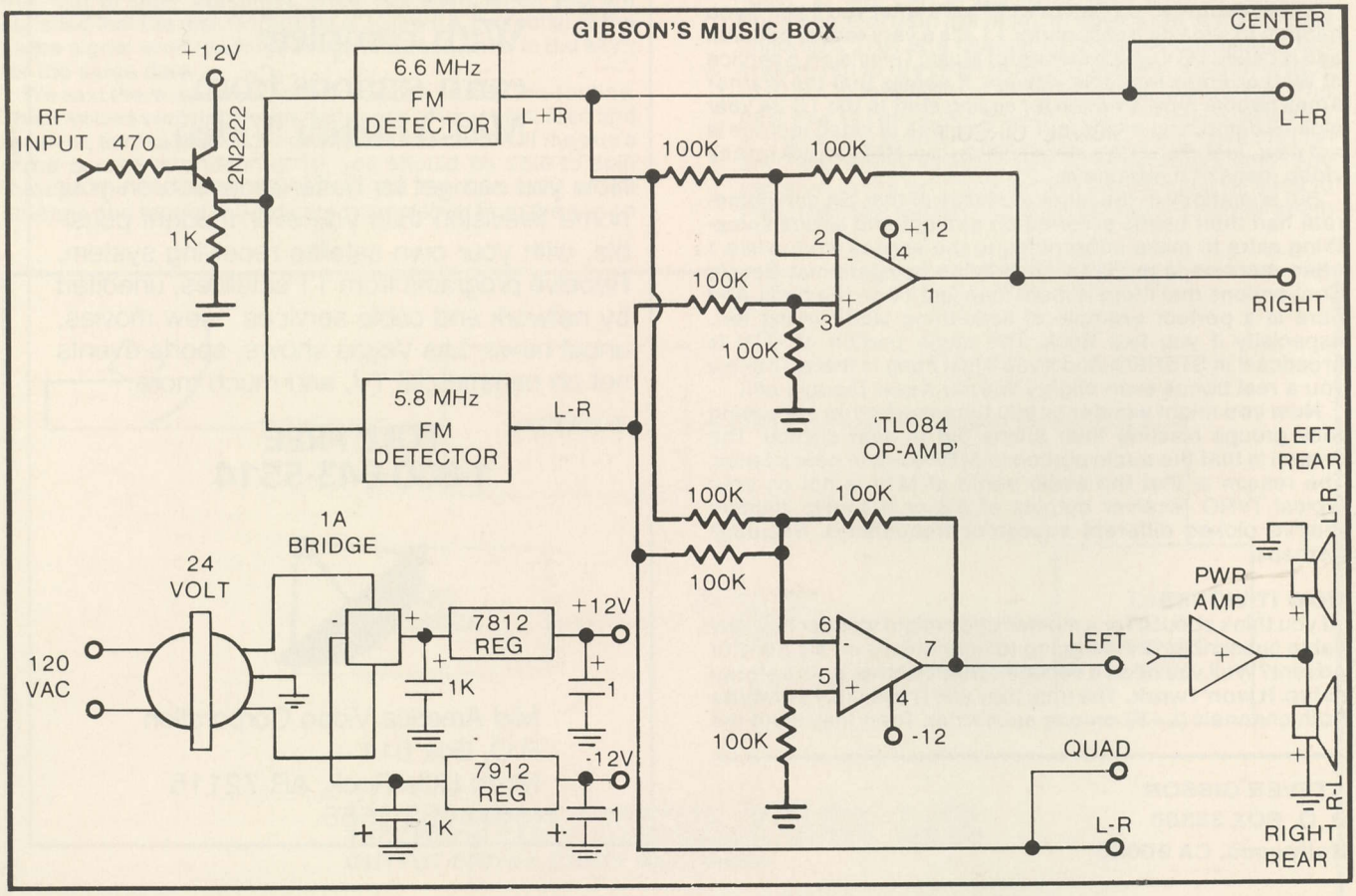
I suspect that the use of L+R and L-R on the subcarriers was to accommodate mono cable systems rather than stereo security. But what the Warner people didn't option was QUADRIPHONIC SOUND (at least until they read this)! And the little Music Box can do it. Quad sound? Yeah...**and does it sound neat**! And if 4 channels don't grab you, then how about 5 channels? It's all there for you to hear.

Here's some background. Back in the dark ages of stereo, David Hafler of Dynaco was experimenting with techniques to eliminate the so called "hole in the middle" between left and right channel speakers. From that effort came a center channel speaker which was simply the left and right channels combined (L+R), **and played 6 dB softer**. Then he went one better and suggested a single speaker BEHIND the listener to add ambience. Logically, this ambience channel would consist of the DIFFERENCE between the channels or L-R. Remember, we started with only 2 channels off tape or disk. This was revolutionary to audio philes, but old hat to motion picture people who had been doing it for years, including Cinemascope. Funny how simple technology doesn't cross-pollinate now and then.

Anyway, Michael Gerzon in England improved on the idea with the typical Left and Right front setup by feeding the difference (L-R) to **separate speakers** located at "left-rear"; and "right-rear", and out of phase. It sounded so good that record people started recording ambience with a reverse matrix set-up. Then they tried discrete channels and you had technology-go-mad, with the consumer wondering **which** system to chose. So much for history. Most stereo recordings have **some** ambience imbedded in them so this technique almost always works. I guess I'm saying it's worth the effort to track down an old amplifier and two small speakers, and try quadriphonic sound.

SIMPLE CIRCUIT DETAILS

The unit connects to your receiver at the same place your internal sound subcarrier detector circuits tap-off. Referring to the circuit, the signal is coupled to a pair of separate subcarrier sound detectors via a 2N2222 emitter follower. One detector is tuned to 6.6 MHz, and will give you a L+R output. The other detector is tuned to 5.8 MHz, and delivers a L-R output. Each detector output is fed into two op-amps. I used a TL084 because it is cheap, available and works rather well. You get 4 amps in a single chip. That sure beats 6SN7's, if you can remember that far back.



A portion of the L+R output feeds the inverting input of the top op-amp in the diagram. The L-R output feeds the non-inverting input. As in typical op-amp fashion, the output is just the difference between the two inputs. So much for the subtraction part of the matrix. Addition is performed by the bottom op-amp by summing the L+R and L-R detector outputs into the inverting input to the op-amp. **Isolation is superb** in this configuration, because the inverting input is driven towards ground.

BUILD IT CHEAP

If you own Tay Howard's Manual, you can easily duplicate his receiver sound section **twice** on a PC board or Vector board or whatever. Or you can even buy some dual sound section subcarrier PC boards and roll it together that way.

But, if you are in a rush (who isn't nowadays) or if you are just learning about electronics, I suggest you take the lazy way and simply buy 2 RCA XL-100 sound section modules. Servicement call them PM-200's. These little plug-in modules are complete TV set sound sections, and simply plug into the popular XL-100. Of course they are tuned to 4.5 mHz (TV sound), but we can tweek them to the frequencies we want. In fact, we can modify them so we get pretty high-FI to boot. Get 2 RCA MAA001A's from a local RCA distributor. They run about 15 bucks each. You may be socked with a $3.00 dud charge.

Modification of the PM-200/MAA001A modules is very easy. We simply reduce the values of 2 capacitors, so we can tune higher than 4.5 mHz, and then add 2 more capacitors to get better sound. First, remove the T299 can and change C290 (82pf) to 47pf. Replace the can. Then change C295 (68pf) to 25pf. Now the unit **tunes** from 5.5 to nearly 8 mHz.

Next, you solder a .01 mfd capacitor from pin 13 on the CA3065 IC to a ground trace. This sets the de-emphasis to 75 USEC using a resistor inside the chip. Then solder a 5 mfd (or so) capacitor from pin 8 on the CA3065 to a spare trace. If you don't see a spare trace, then cut the trace from pin 8 on the CA3065 leading out to the edge of the board. Then solder the cap across this trace cut. Just be sure the cap is polarized (end with + on it) towards the chip. Now you have a DC blocked output to your amp. We don't use the pre-amp inside the chip because a quick look at the distortion specs would drive any audiophile back to AM radio!

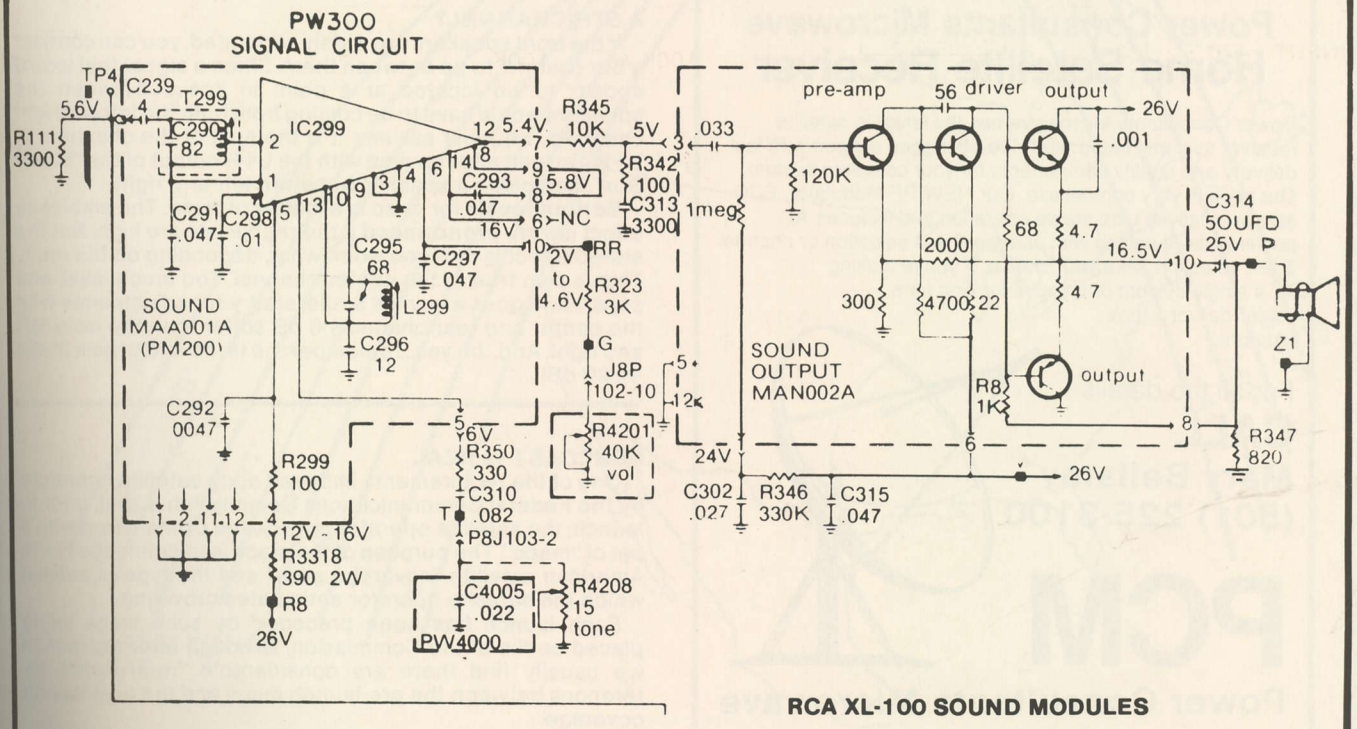
Last, solder a 50K PC type mini pot from pin 6 on the chip to a ground trace. This is a volume control, that we use in the **mixing** process. You can use larger shaft-type pots and mount them on the front panel, but they are likely to get bumped later on and will only REDUCE stereo separation.

MORE CONSTRUCTION TIPS

Aside from the PM-200's, nearly all the parts for the "Music Box" can be bought at Radio Shack. I used a cheap metal cabinet and mounted RCA jacks for all the outputs to my stereo sytem. The RF input was on a BNC jack. Use mini-coax up ot the emitter follower. It can be soldered to the bottom of either PM-200. Then run more coax to the other PM-200. The op-amp was mounted on an experimenter's breadboard. All boards were mounted on stand-offs. Be sure to use voltage regulators to smooth the ripple. The op-amps, when running from a bi-polar supply, won't see ripple, but the little PM-200's want **pure** DC.

For the most part, construction is not critical other than the suggestion that you use coax to feed the PM-200's. Also, you should use **5% 1/4 watt resistors** in the op-amp matrix (all 100k). While the pots on the detectors can be used to compensate for tolerances, we do want the tune-up process to be easy.

Next, you should modify your receiver. Find the location where the 6.2 and 6.8 MHz detectors connect. Then run more mini-coax to a BNC, or type "F", or RCA jack you mount on the rear of the receiver. Take your choice. Use what you have (or whatever is hanging on a card in Radio Shack). The signal is then patched to the Music Box with more coax.



RCA XL-100 SOUND MODULES

TUNE-UP HINTS

There are two ways to make the "Music Box" play. You can simply set both 50K pots for minimum resistance (that's maximum volume), and tweak the T299 coils and L299 coils for sound. But knowing **which** subcarrier you are on may be a trick. Add to that the possibility that you may have both detectors tuned to the same carrier, and you're sure to see there must be a better way.

Use a signal generator and set it to 6.6 MHz. Feed it into pin 3 of the L+R module. The pins on the board are numbered left to right on the trace side, but 1 & 2 are combined as are 11 & 12. Put a scope on **pin 9** of the IC and **tune** the coils **for maximum**. Back the generator down below limiting, and peak again. Do the same procedure for the other L-R module; only set the generator to 5.8 MHz. **If** the generator can be frequency modulated by an internal oscillator, set it to 75 kHz and adjust the L299 coils on **each** module for cleanest waveform. A THD analyzer is a better eyeball, if you have one.

At this point, you should be able to connect everything and hear pretty good stereo. Use headphones to verify. Some of the music is in mono, so don't worry if your first blast of sound is in the middle of your head. If you used 5% or better resistors on the op-amps, you may be finished. Otherwise, the two 50K pots may need adjustment for maximum separation.

Tweak either pot for best separation or connect the outputs to the H and V inputs of an old oscilloscope. Without sweep, you'll see a "ball of yarn" display. Adjust for the most symmetrical jumble. What else would one do for rock and roll?

Next, connect the speakers. Watch phase, because phase is everything in a quad set-up. If you are unsure, then first place a 1.5 volt cell momentarily across the voice coil of each speaker and note which direction the cone moves. **Mark** the speaker lead with a "+", when the cell polarity causes the cone to move outward. All this is arbitrary of course, but serves to give you a reference from which you can work. Connect the quad amp. Note that the speakers on it's output are connected in parallel BUT OUT OF PHASE. The L-R goes on the left rear as you face the main speakers. The R-L goes on the right rear.

A 5TH CHANNEL?

If the front speakers are widely separated, you can connect a 5th channel to go between them. Since a signal that would appear to be located at a point in space between the speakers would have to be coming from both the left and right channels, we must assume it is the sum of the channels or L+R. So feed another amp with the L+R output of the "Music Box", and place a speaker **between** left and right.

Setting levels for quad is a matter of taste. The ambience effect is **very pronounced** if the rear levels are high. But the stereo effect is reduced, somewhat, depending on the room. This is also true of the center channel. Too much level, and separation goes away. As a rule, start your adjustments with the center and rear channels 6 dB softer than the main left and right. And...oh yes...remember the threshold of pain is still +120 dB!

FORECAST vs REAL

One of the requirements imposed upon satellite operators by the Federal Communications Commission is that, prior to launch, the satellite operator provide the Commission with a set of "maps". The purpose of the maps is to define the North American satellite "coverage area" and the type of service which the satellite operator anticipates providing.

Each launch has been preceded by such maps being placed on file at the Commission, although after the launch we usually find there are considerable "real world" differences between the pre-launch maps and the post-launch coverage.

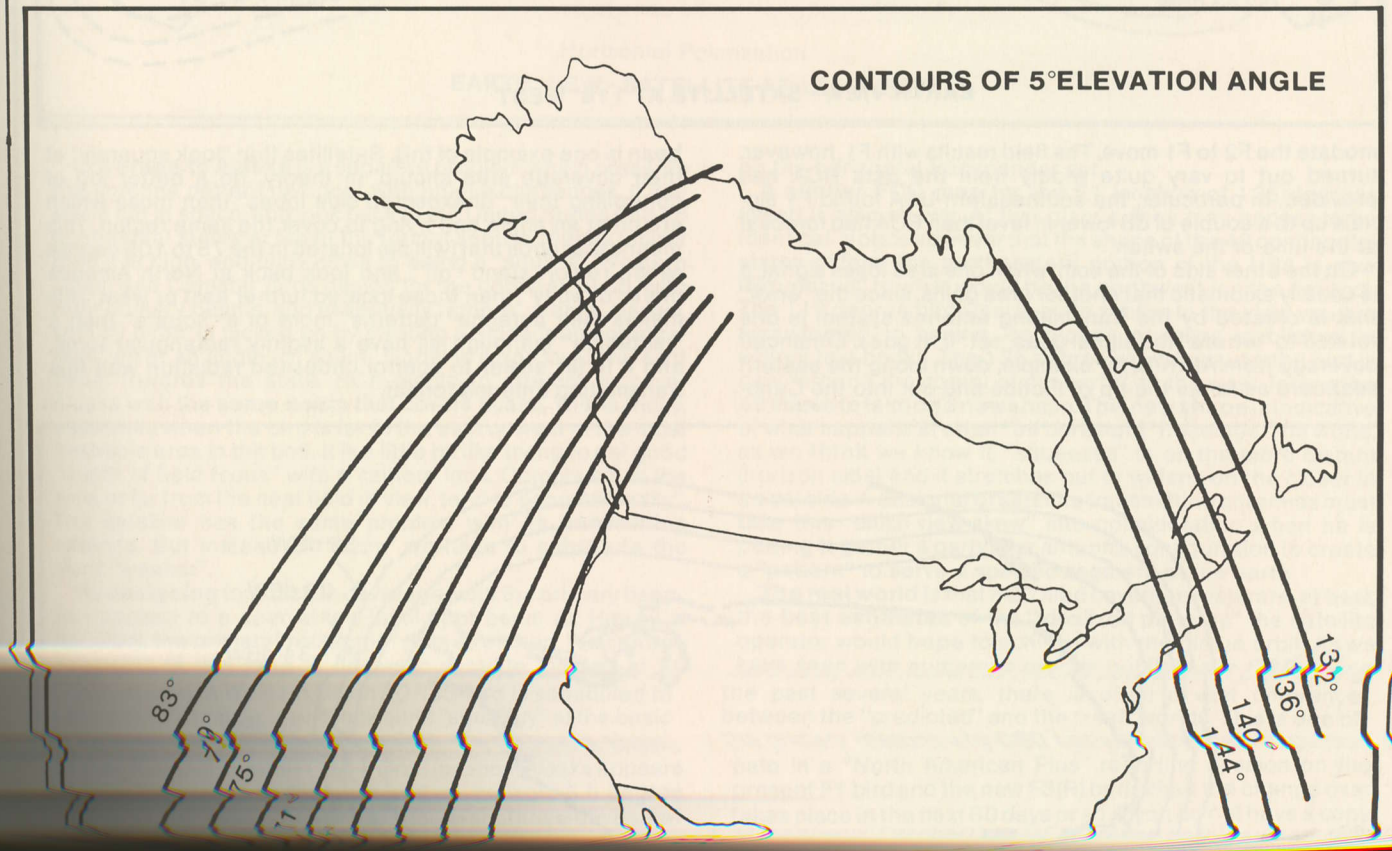
Of all of the hardware and equipment built into the satellite, it is the **transmitting antenna** on board the bird which determines (more, perhaps, than anything else) how "well"

SATELLITE POTPOURRI

the satellite actually functions for each of us individually, or all of us collectively. All domestic satellites (U.S., Canada) utilize "directional antennas"; transmitting antennas which purposefully direct the transmitted energy towards a particular part of the earth below. Now directional antennas are difficult objects to tame; they often will do unpredictable things in space. Things which they did not do when checked out prior to launch, on the antenna testing range. It is for this reason that we find satellites "missing" their coverage objectives, with signals **reduced** in the areas where they are supposed to be strong, or strong in areas where they are supposed to be weak.

If the birds often fail to achieve their "planned coverage", what good then is the map filing procedure? The FCC seems vague as to the amount of "legal power" they may (or may not) have to "force" the satellite operators to maintain their "forecasted" coverage "zones". **Originally**, the Commission insisted that the coverage maps be placed on file when the initial application to launch the satellite was filed. In more recent years the FCC has become so lenient that coverage maps are often not filed until just weeks or even days ahead of the launch.

Very small variations in bird coverage patterns can play a big part in the successful use of the satellite. When the cable television industry moved from F2 to F1, in 1978, RCA provided the cable industry with their **best estimates** of the differences between the two birds. These maps were published and widely distributed, and cable operators had what they **thought** to be adequate data to plan any changes in their terminals (better LNAs, bigger antennas, etc.) to accom-



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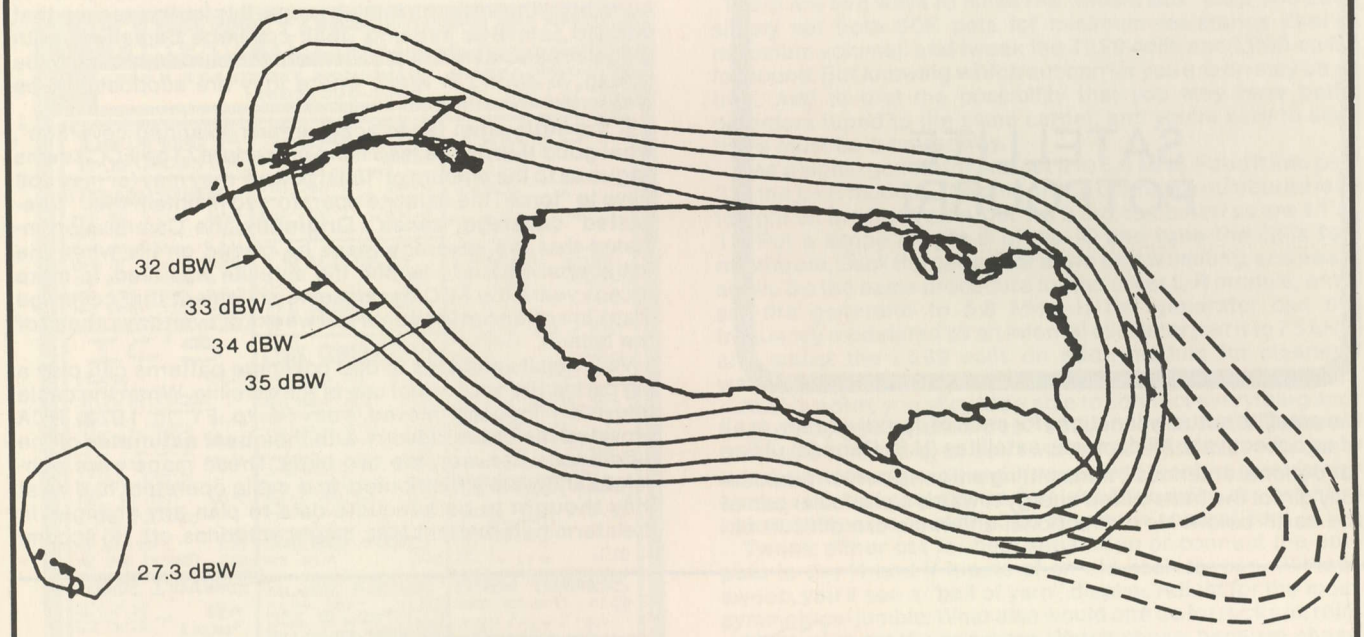
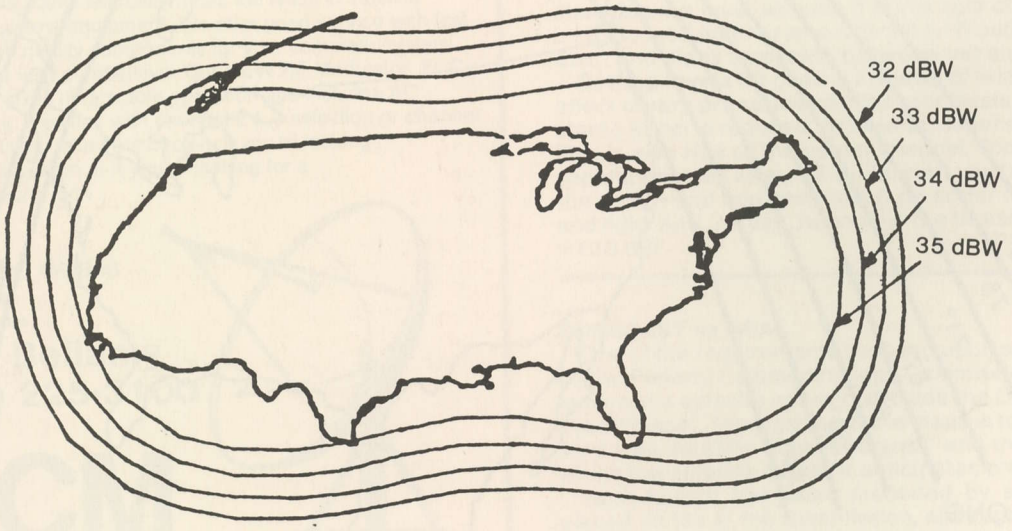


EARTH VIEW - SATELLITE AT 119° WEST

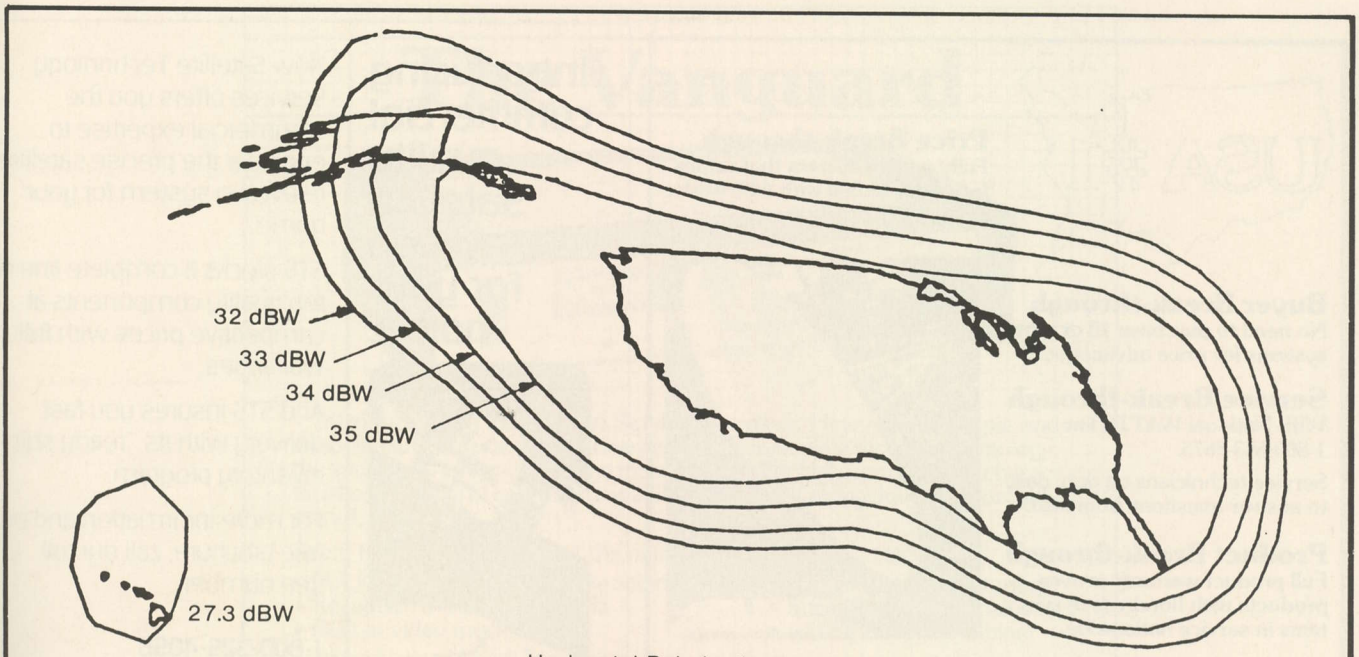
modate the F2 to F1 move. The field results with F1, however, turned out to vary quite widely from the data RCA had provided. In particular, the southeastern USA found F1 signals up to a couple of dB lower in level than RCA had forecast at the time of the switch.

On the other side of the coin, when one area loses signal, it is usually axiomatic that another area gains, since the "error" that is created by the transmitting antenna system is one related to "**where**" the signal goes, not "if" it goes. Enhanced coverage from ANIK-B, for example, down along the eastern seaboard as far as the tip of Florida and out into the Caribbean is one example of this. Satellites that "look squarely" at their coverage area should, in theory, do a better job of controlling their "unexpected side lobes" than those which are off at an angle and trying to cover the same region. This means that birds that (will be) located in the 75 to 105 degree (west) region stand "off", and look back at North America more "directly", than those located further east or west. This makes their antenna "patterns" more of a "square" than a "rectangle" (although all have a slightly rectangular form), and it is far easier to control undesired radiation with this transmitting antenna format.



Horizontal Polarization

EARTH VIEW - SATELLITE AT 79° WEST



Horizontal Polarization

EARTH VIEW - SATELLITE AT 135° WEST

Coverage to Alaska is a separate problem which presents the antenna pattern designer with unique challenges. If you stand out in space, and look back at the United States (the 48 continental states at least) the format seen is slightly longer than it is high, and fairly close to being a "square". Western Union and Comstar birds design for the continental 48, with their primary beams, and essentially "ignore" Alaska. Hawaii, with all birds, is picked up by sticking a small "sub-antenna-feed" off at an angle to "squirt" signal in a tiny low-level spot beam towards the state. RCA elects to attempt to cover Alaska with the **same beam** that covers Miami. This is tricky, especially when the bird is far to the east or west of the most desirable area in the belt. It is a little bit like trying to get good "depth of field focus" with a camera lens. Objects off to the side, or far from the near field of view, tend to become "fuzzy". The satellite has the same problem with its transmitting antenna. But instead of "fuzzy" we have to substitute the word "weaker".

By designing for Alaskan coverage (with the primary beam, as opposed to a special low-level spot beam as Hawaii is handled), the primary "rectangle" gets stretched. We can see examples of this here. A domestic satellite located at 79 degrees west (A Western Union TDRSS bird is scheduled to be here), for example, would look quite "squarely" at the basic 48 states (plus Canada and Mexico). It's pattern is shown here. Note that from this Clarke Orbit location, Alaska appears as an "edge blip" on the northwestern horizon. A 5 degree "look angle" barely makes it to the lower southeastern corner of the main body of Alaska.

A satellite located at 119 degrees (west), or the present F2 location, can however "see" all of Alaska with at least a 5 degree look angle. This is one of the reasons RCA initially placed F2 here. An FCC map depicting that is shown here. What this map does not accurately portray is the "flip side" of the elongation of the pattern towards the southeast. If you look closely at the way the distance between the contours "spread" for the Alaskan end, you can imagine that a similar effect is also happening on the Caribbean side. We have modified this map with our own dashed lines on this end to reflect where on-site tests by "Davy Behar" and others indicate the real pattern from F2 really does extend, at least on the horizontal transponder set.

A similar FCC map for the F1 location of 135 degrees (west) is also shown. At first glance, they may appear to be identical. Notice however that the shape of the 48 continental states differs; the northeastern portion of the USA is now "Squeezed" to what would be the northwest (on the ground). The 119 degree bird view is quite similar to the view you are accustomed to seeing, on globes or maps, published in school text books. The 135 degree view, because the bird is now "around the corner of the earth", to the west, forces the 48 states to take on a new shape. This new **shape** is indicative of what happens at other "off boresight" headings. The world, as we **think** we know it, "squeezes" in on the more distant (horizon side) and it stretches out or widens on the closer in (to us) side. A designer of satellite transmitting antennas must take this "earth-view-skew" into consideration when he is putting together a particular antenna configuration to create a "pattern" to serve a specific segment of the earth.

The real world is that FCC filed coverage maps are, at best, the **best estimates** of the "idealized patterns" the satellite operator would **hope** to achieve with the bird in orbit. As we have seen with numerous reports published in **CSD** during the past several years, there is often a vast difference between the "predicted" and the "real" worlds. This is one of the primary reasons why **CSD** has asked readers to participate in a "North American Plus" reporting session on the present F1 bird and the new F3(R) bird, when the change over takes place in the next 60 days or so. If you do not have a copy of the special October (1981) **CSD** report on this subject, with the special logging form to report your observations, we ask that you write us here at **CSD** for a copy of the reporting form.

BIRD OPERATIONAL NOTES

PREDICTION of more than four years ago, that Morman Church would go into satellite distribution business, finally coming to pass. Church has installed first of two massive uplink terminals in Utah, purchased 3.5 transponders from Southern Pacific Communications for SPACENET 1 bird due to go into operation in early 1984. Church has also placed order for nearly 500 TVRO terminals, 3 to 4 meters in size, at approximately $7,200 each. Church will use system for many intra-Church functions including daily youth education programs.

REMEMBER detailed study of problems surrounding delivery of US Domsat signal services **outside of** USA? Southern Satellite is back at it, asking FCC to approve delivery of WTBS to Bermuda pay TV system and three cable systems in Mexico. Defacto delivery is already operating in both countries with dozen plus private terminals in Bermuda, several dozen in Mexico including many at hotels in resort cities. FCC attitude now appears to be different than during previous Carter administration; approval may well be forthcoming. If it does, requests to deliver other signals (beyond WTBS) will be quick to follow.

CANADA, it turns out, is insisting that ANIK 1/2 delivery of four "super stations" (all Canadian) via satellite, to low power TV stations and private terminals in north, shall be **scrambled**. Canadian Satellite Communications, the firm that won approval to carry the signals north, has signed a deal with Oak for their Orion system. Any service you have seen, unscrambled, is temporary.

NEW BIRD news. RCA now scheduled to launch **SATCOM V late in 1982; with service scheduled early in 1983. Bird will have 24 transpodners, all 8.5 watt per channel, but will be dedicated to Alaskan service. Western Union received FCC approval to build WESTAR VI** with launch scheduled for last quarter of 1983. This one too will be higher power (at least 8.5 watts per channel), and 24 channel.

FAULTY Motor test system apparently was the cause of failure that pushed SBS-2 launch back into early October. SBS-2 shares with F3R and F4 dependency on Delta launch vehicle, so F3R new launch date now scheduled for mid-November while F4 will probably not fly until just after first of year. NASA needs 6 to 7 weeks between launches to "get ready". RCA will require minimum of 6 weeks and possibly 10 weeks to get both new birds into Clarke-Orbit positions assigned, tested and checked out for service. This pushes F3R start-up date (assuming successful launch) to as late as early February.

PUSH BACK of F3R and F4 operational dates (F4 will probably be ready around mid-March) will delay shift of cable net 1 to F3R, and start up of several new program services due to appear there. NASA hoping that by time WESTAR 4 is scheduled to launch (March or so) they can get back onto schedule.

NEW RADIO network services continue to sign-up, announce or pop up on birds. United Stations Country Music Network is scheduled for operation on Westar 2, TR3. Service to be 24 hour per day, newscasts each hour, special features and live concerts. Users are affiliated radio stations. The National Black Network was scheduled to begin using Westar 1 for feeds to affiliates of "Night Talk", all night radio talk show October 19th.

SONY may be showing its plans for satellite hardware. Recently announcement of a new digital radio transmission system that handles 16 separate radio channels (stereo) in spectrum space used by one TV signal (i.e. single transponder) was, Sony said, forerunner to announcement of new digital TV system along similar lines.

BATTLES to keep 12 GHz out of air and on drawing boards expanding. Latest protest to FCC comes from Operational-Fixed Private Microwave Systems. Group now uses some of the 12 GHz spectrum planned for DBS downlink. They say two systems cannot co-exist in same spectrum at same time,

want FCC to stay formal approval of DBS until their perceived interference problem is resolved.

SBS which tried to lease out six of its 12 GHz transponders for "interim" or temporary DBS use pulled back after finding only two "qualified takers". Industry feeling is that SBS wanted too much money for what they were offering, and with no receiver hardware in place, no market for any service that might evolve. It appears to have been a good idea, but bad timing.

HOW BIG might 4 GHz home terminal business grow over next few years? Suddenly everyone wants to know. One barometer, projection TV systems for home use, should sell 100,000 units in $2,500 to $4,000 price range in current 12 month period. HOME VCRs, meanwhile hit 200,000 units imported per month, from Japan, for first time this past July; with typical retail price tag of $1,000 (and annual sales in 1.5 million region). If 1.5 million people are willing to pay $1,000 for a new video gadget, and 100,000 are willing to pay $2,500 to $4,000 for another video gadget, how many would purchase $5,000 to $7,000 "video gadget" (i.e. home TVRO)? Consensus seems to be that given same type of national promotion **and exposure** that VCRs and big screen projection sets now enjoy, home TVRO marketplace for **current** 12 month period should be at least 45,000 units. This appears to be more than twice what the industry is actually doing; attributeable to lack of well oiled industry promotion campaign, and lack of major national "brand name sellers" in marketplace.

FAILURE of Indian Apple experimental bird, build by Ford, to fully deploy solar panels, has Indians talking about building their own second generation "Insat".

USE of F1 transponder 15, by Fisher Broadcasting (operating KATU Portland and KOMO Seattle) is temporary, and largely in early evening. Southern Video Network, with Florida based sporting events, also using TR15 for prime time evening feeds...for now.

US HIGH SCHOOL may have been lucky in obtaining permission from Canadian Consulate in Chicago to "use ANIK transmissions for school experimental purposes". Hall Township school obtained written permission, which startled those who have been battling red tape at both governments to do same thing. Difference: Consulate Office may not have known **what** it was granting, probably lacked authority to grant what it did. And, school's use is not commercial nor for "entertainment purposes".

HARD ON THE HEELS of announcement by Morman Church that it would become heavy user of satellite communications, the U.S. Catholic Conference made a similar announcement. USCC plans to launch five hours per day of programs by September of 1982, with some limited start up in March or April. Under the plan, each diocese will purchase own terminal with suggested guidelines from USCC.

C-SPAN, it now appears, will have a transponder for its service coverage of Congress on F3R. Just which one, and when, is not announced. TIME, Inc. involved in purchase of USA Network (TR9), where C-SPAN has been sharing available time.

SelecTV, now using Westar 1 transponder it acquired from Gene Autry's VUE to feed some 15 outlets nationwide with daily STV programming, may be moving to Comstar D2 (10V) and then Satcom F4.

GANSAT, new satellite program arm of large Gannett communications empire, will start as a mini-program source for PBS stations using Denver uplink on Westar 1 to feed "America Today". GANSAT has been trying to create its own "unique" video service to tie together its seven TV broadcast stations and national chain of newspapers.

PHOENIX HOME/GARDEN, a regional publication in Arizona, featured article on satellite user Bill Fry and advertisements for home terminal systems in September issues. Publication is widely read by home builders; a good way, in your area, to get "satellite terminal message" into hands of influential people dealing in big ticket items.

COOP'S BASIC MANUAL - This is the brand new STTI Manual that is devoted entirely to the fundamentals of designing and installing a top performing private satellite terminal. What you **MUST DO** to get peak performance, on every transponder, all of the time. The little things nobody ever tells you about. Stuff you need to know!

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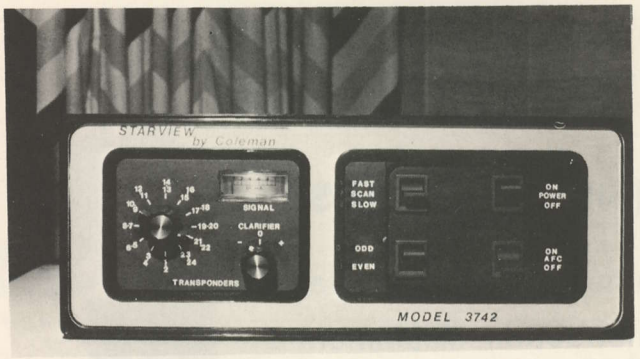

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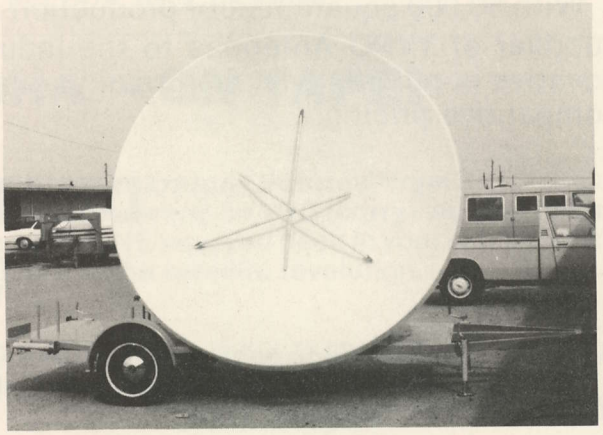

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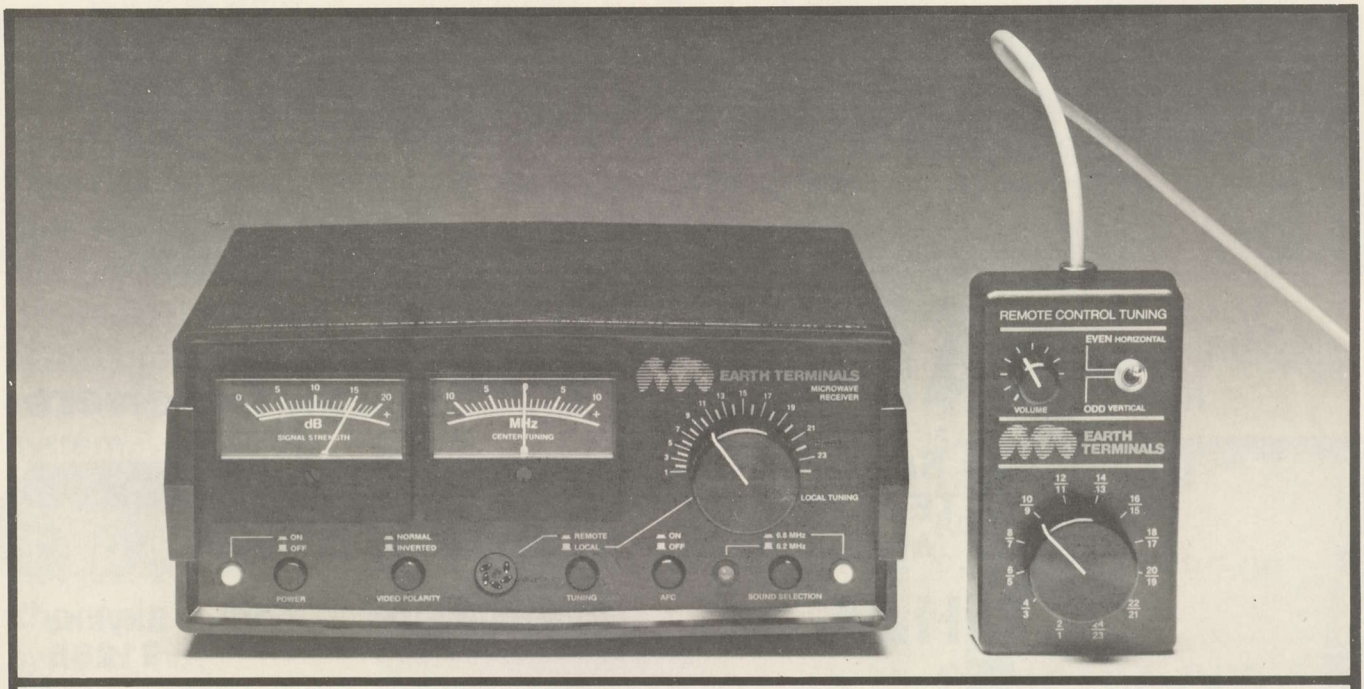

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- **VCR COMPATIBLE** - Video and audio levels allow use of your VCR as a modulator, providing immediate recording without cable changes when desired.
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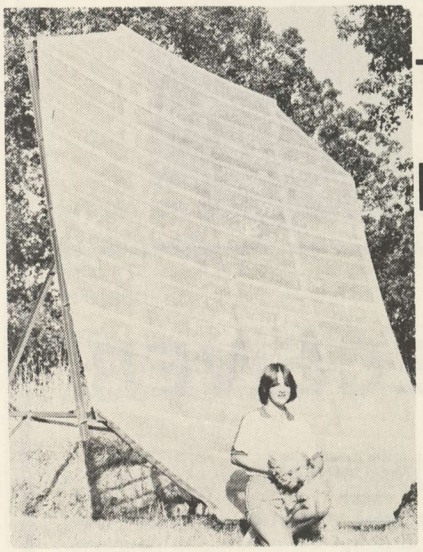
The 8-BALL



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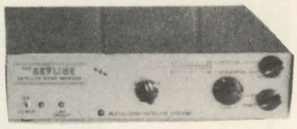

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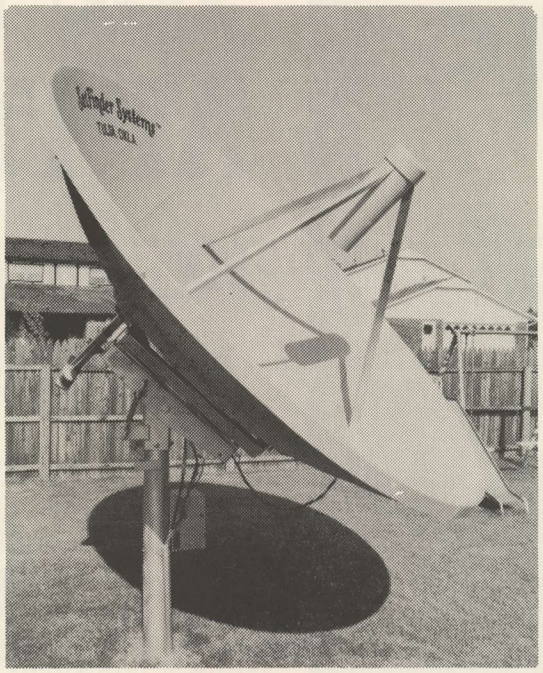

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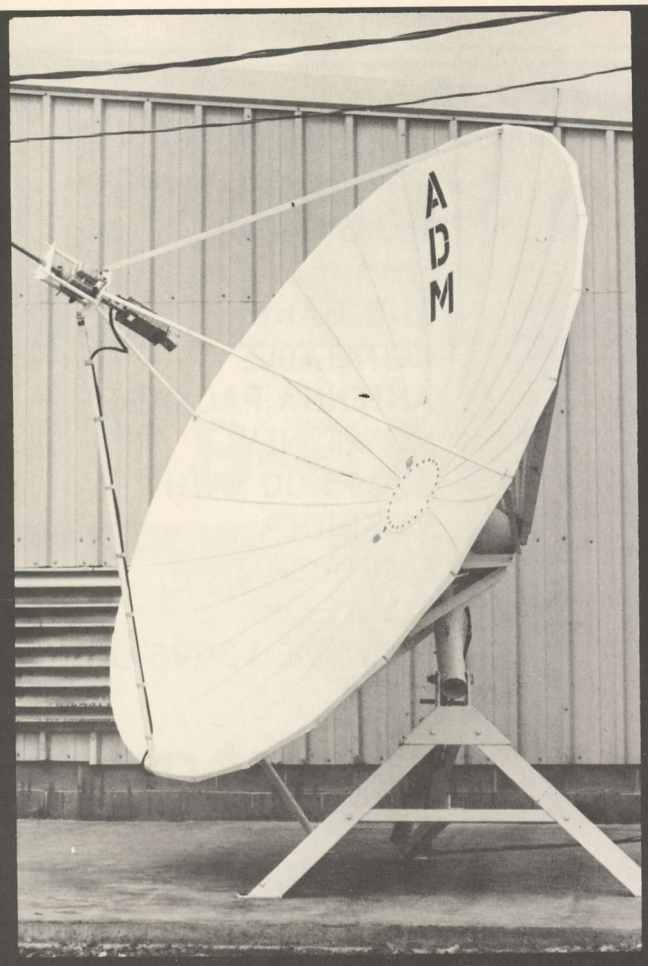

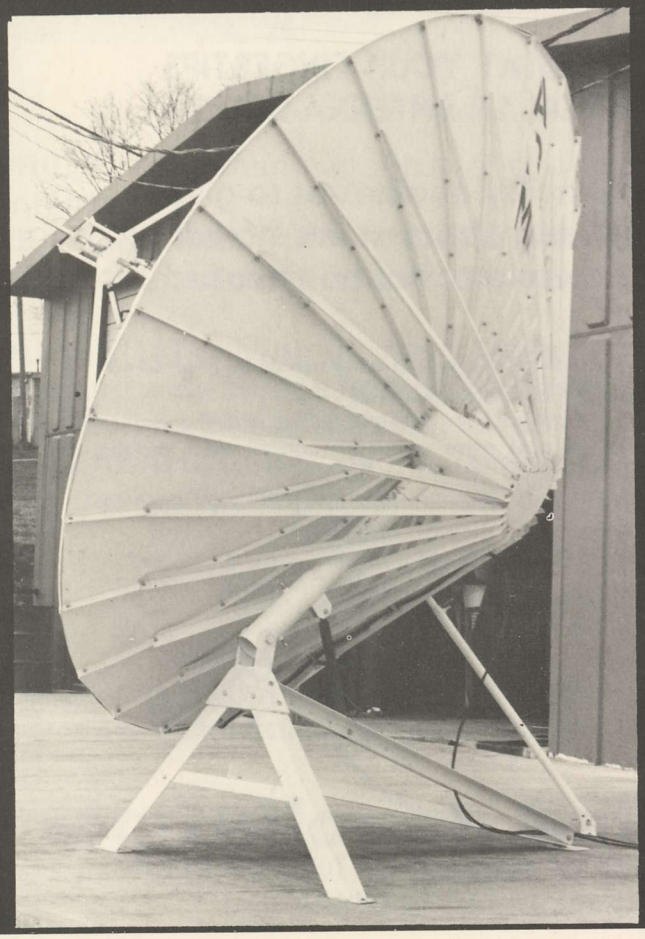

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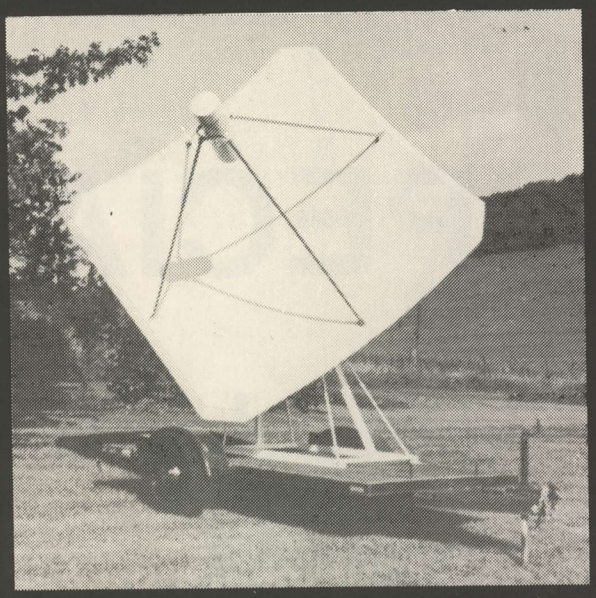

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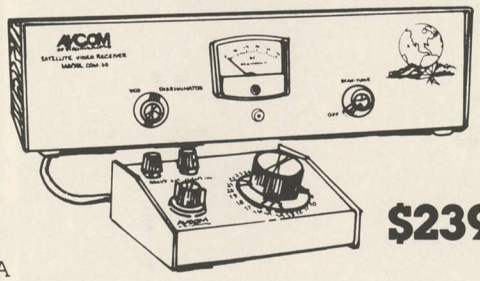
AVCOM COM-3R



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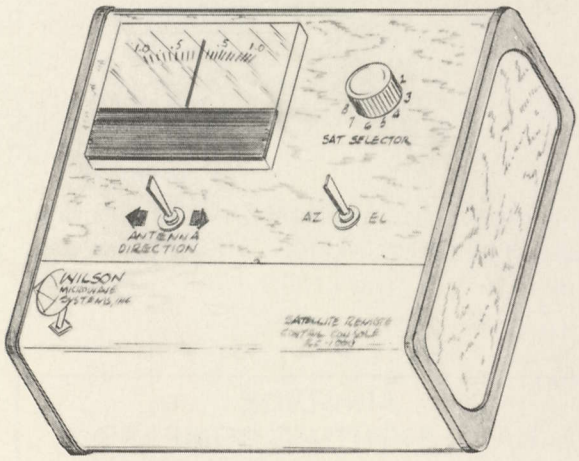

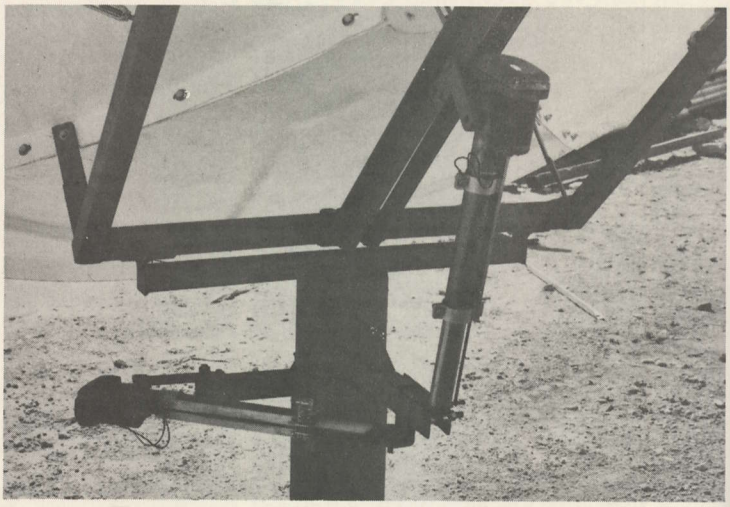

The optional remote control feature allows you to control movement of the azimuth and elevation positions of the antenna from the comfort of your easy chair – without having to go outside. This feature may be added later.

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THE AVCOM RECEIVER STORY

AFTER TWO YEARS

We had some people over for dinner down here in the Turks and Caicos. The Coopers are not big entertainers but we felt we wanted to get to know one of our WIV television sponsors and his wife better so we had them come by for dinner and some "out takes" from the the TV world. Those who have attended many of the past SPTS/SBOC events know that we have a collection of "TV bloopers" from the networks and others which are at best hilariously funny and at worst often terribly risque.

After a typical island dinner, we headed into the control room to sit through the out takes. After Mork and Mindy, Star Trek, the winner of all time (The Price Is Right), and several dozen more, our guest (Vic) asked how all of this got started. I started to explain it to him and then remembered that I had an old Beta tape made off the Walter Cronkite **CBS Evening News** on October 31, 1978. That was the night the American public visited my home outside of Arcadia, Oklahoma, and through the eyes of CBS TV cameras, saw me operating our pioneering satellite TV terminal. Vic watched it with interest and then commented **"You mean ALL of this started only three years ago!"**

Well, it did in the sense that my **TV GUIDE** article, and appearing on the **CBS Evening News** started three years ago. But what you are a-part-of actually began only **two** years ago. Which is an around the horn way of introducing you to Andy Hatfield, and his AVCOM line of receivers. Andy is the quiet one, always dressed like he just stepped out of a Brooks Brothers ad, at the AVCOM booth at the SPTS shows. Andy and Pat Hatfield have been to every show. They, along with ICM, were among 8 exhibitors appearing at the first SPTS in August of 1979. I had been introduced to Andy almost a year prior to that time.

Andy Hatfield was employed by a large computer technology firm. He was (and is) a ham radio operator. Pat taught school. In his spare time, he (or they; I'm not sure which) operated a ham radio business which sold VHF and UHF parts and pieces which Andy had designed, and sold through advertising in the amateur magazines. There was nothing unusual about this; there are dozens, if not hundreds, of similar ham business in operation today.

Between his well paying employment, Pat's working, and their "side-line" business, the Hatfields had some money to play with in the fall of 1978. They decided to invest in a home TVRO. They had to be in the first 25 or so to do so, nationwide. I remember Andy calling me on the telephone to ask which receiver I thought was best. At that point in time I was high on a Microdyne unit. They sold for nearly $7,000 and Andy said "ouch", or something like that. Well, he bought one (the famed Microdyne 1100 TVR 24 channel receiver) and he shortly became intrigued with what made it play inside. If you have never seen inside of an 1100 TVR, you have never really lived. There are more gold plated (literally) connectors, short chunks of control wires running around inside of this old "battleship" than with any receiver built before, during or since its time. It took me several months just to figure out **which** of the brushed aluminum, tightly sealed up, sub-modules **did what**. It took Andy Hatfield about the same time to sit down and using the Microdyne as a starting point, **design his own receiver**; from "Microdyne" scratch.

By the time the first SPTS was coming on the horizon the Hatfields were pretty convinced they would have a go at selling satellite equipment. Andy and Pat showed up, and before the show Andy acted as if he might be able to sell four or five a month; sort of "supplementing his sale of amateur radio hardware" through his established company. The day **after** the show we talked again. Andy had done so well, that he now had a very difficult decision to make. **If** he produced four or five TVRO receivers per month, the orders he took in at the show were going to keep him busy for more than a year! Yet this whole thing was brand new, untested and unproven. Suppose he "quit" his job (of ten plus years) and devoted full time to satellite receivers? And suppose the whole thing fizzled and...then what?

Well, it had to be a difficult decision for Andy. But he did it right. He devoted fulltime to designing, producing and proving the AVCOM receivers. Less than one year later, Pat would hang up here teacher's credential for the last time also.

To know Andy and Pat Hatfield is to have tremendous respect for their concise, straight way of doing business. They both obviously come from good stock. Andy is about the most frugal and conservative of the established suppliers in the field. He still worries about tomorrow. But during the two years since the first AVCOM receiver was shipped (I wonder who has **that** collector's item!) he has watched his baby grow into an extremely well regarded product line and has resisted the temptation to cheapen the product.

I have observed the Hatfield progress since that first show. I have played with every model he has ever produced, but until recently I have never owned one. Several of my contemporaries have chastized me for that. Bob Behar and David MacZura, in particular, have repeatedly told me "**If anyone needs AVCOM** sensitivity, **it is you in the Turks and Caicos**".

Well, I am frugal also. And at the various shows, I have always spent time tuning the AVCOM receivers, and then going next door and tuning a Washburn or a Teknimat or other in that "top of the line" class, and have usually come away convinced that while the AVCOM performed very well, I could not see it to be any better than other top of liners. And they do cost quite a few more bucks than the others.

Then late this past spring I spent a few hours at Bob Behar's house, and he insisted that I do a direct A/W comparison between AVCOM and a Washburn. He had set up twin monitors, fed by a 4 GHz signal splitter. Each side of the splitter fed a receiver and you could observe the performance of both simultaneously on the same transponder.

"**How do I know this is a typical Washburn?**" I asked, after seeing a solidly better picture on the AVCOM. Bob assured me it was typical and he was quick to add "Clyde builds a great receiver. But the AVCOM is better, when the signal is weak". I was impressed but not convinced. Bob Behar then took me to his warehouse and we selected one of each in factory unopened boxes. I unpacked them, hooked them up, and we repeated the tests. The results were the same. The AVCOM had a better picture.

But I was not convinced. The AVCOM receiver, was after all, a single conversion receiver. And while I knew, understood and admired Andy Hatfield for his careful attention to performance detail, I could not see stacking up single conversion receivers in my television station. I didn't want to get into the isolator business, nor having to constantly be concerned about where the images fell was not my cup of tea either.

David MacZura at SatFinder then went to work on me. "**Why do you sell only AVCOM receivers?**" I asked David. "**Be-**

cause they work the best for me" David answered. That was about the time we were working out the details to get a 10 foot SatFinder down here (see report in **CSD** in August 1981). When the report appeared in print, MacZura started on me again. "**You know, we** feel **like you would have gotten better results with an AVCOM receiver!**". I didn't respond. "**I called Andy and asked him why you don't have one**" David went on. "**I told him to send you one**".

Well, Andy Hatfield did just that. Only Andy and I agreed that I would **not** write about **that one** since it was an older design double conversion receiver. "**We are not** now **producing double conversion units**" Andy explained "**and this one has been kicking around since the time we did**". I said Andy was frugal. "**But it works good; as good as any we ever shipped**".

The AVCOM double conversion unit arrived down here while we were at the Omaha SPTS. I anxiously unpacked it upon returning and connected it onto the HERO 20 foot dish. The pictures **looked** great, so I took the best performing Washburn/Earth Terminals receiver we had in service and fed them both through a splitter. I wanted to see if Bob Behar's tests were valid; even if I had been present when they were performed. We all, after all, like to think that **our** own system situation is "special" or "different", and what works best for one fellow may not follow for us. My results were duplicate to those I saw at Bob Behar's home.

Now I had a real problem. I had a one-of-a-kind AVCOM receiver which worked remarkedly better than anything else in the house. I thought it would be fun to put it into a shoot-out against my own Microdyne 1100TVR since I knew the first AVCOM's started out as Hatfield-engineering learned from the 1100 TVR. I connected both up, with a splitter, and swung onto F2's TR8; the strongest signal (other than Russia's Ghorizont) down here. The AVCOM ate the lunch of the $7,000 (in 1978) Microdyne. Not just by a little bit; but by a lot!

Back to my problem. The older AVCOM was a gift from Andy and Pat. I had agreed that I could not write about it since people would pester Andy, asking for their own double conversion units. And, if there was ever an opportunity for somebody to really spend some time getting a receiver to fly at tip-top performance, the AVCOM gift receiver was it. I'm **not** suggesting that Andy has any time in his busy schedule to "doctor" a receiver for me...but other people would think that could have been a possibility.

My problem was magnified by the fact that we saw sharply better picture quality, and color fidelity, on the AVCOM than we saw on the others in the station. Naturally, I always want to transmit the best picture I can, so here we were back to switching the receiver around from source to source with too frequent regularity.

I decided I had been frugal long enough, and when Kevin and I flew to south Florida in mid-September to get some video gear repaired, I paid Bob Behar hard cash for a new AVCOM receiver; one of the current, **single conversion** units. In five years of fooling around with satellites, this is the third receiver I have ever laid out hard cash for. Which ought to tell you something.

Within two weeks of returning with the second AVCOM unit, and checking it out against the original "out of production double conversion unit" I called Bob Behar and ordered **a third.**

Now I am certain many people have done the same comparison we did. You take an older AVCOM, double conversion unit, and you compare it side by side with a newer, single conversion receiver from AVCOM. In our case, the double conversion is "old" while the single conversion bore stamps indicating it was produced in August of this year.

I was pleasantly surprised to see that if you placed both on the same signal, at the same time, you could not tell (by eye) which was which. **They are simply identical in performance. If my observation with the second AVCOM was not sufficient, when the third arrived I repeated the test**

and came up with the same results; again.

For those who may be new to our method of reviews (of receivers in particular), these words:

1) We live and operate in an area of the Caribbean where no satellite is strong. Our F1 pictures here, on a 16 to 20 foot dish, look like the pictures you would expect in Iowa on a 6 to 8 footer. Not good.
2) WESTAR (1 and 3) signals are better than F1, but not much. The strongest **US** domestic signal is on F2 TR8; but how much NBC can you stand!
3) We have from four to six satellite receivers operating full time; they provide us with our program sources for our Turks and Caicos Islands national television service we operate.

Therefore, our pictures are received and displayed on a monitor (**so far**, we are just like you) and **then** we run them through vertical interval switchers, through special effect generators, through titler machines for caption/over/video, through a processor amplifier, a modulator and then into a studio to transmitter link transmitter. Finally at the "real" transmitter, our pictures are frequency converted from the studio to transmitter link frequency to our channel 4 VHF operating frequency. And then finally they are sent through the air into the homes of our island, and surrounding islands.

I tell you this, or remind you of this, because we have ample opportunity to degrade the received signal long before the end-of-the-line viewer feasts his or her eyeballs. **Anything** we do is bad so we would like to start out with the best video quality, and signal to noise ratio possible.

Your eye might not detect a ½ dB reduction in video signal to noise; my proc amp or titler detect changes as small as 2/10ths of a dB in video signal to noise. They do more than **detect** these changes; they may fail to work properly, or at all, if my SNR degrades below individual "threshold" levels. And that hurts our "on the air look".

This makes **our** testing situation **more critical**, and more demanding, than perhaps any other in the world today. We see glitches and problems far sooner than your eye will; no matter **how** trained it might be, when we shove the satellite video through so much follow-up gear.

The message here is not new; it has been repeated in virtually every issue of **CSD** since inception. When satellite signals are strong, there are many receivers you can use with satisfactory results. When satellite signals get weak, well...it takes a very good receiver to keep them watchable, or useable.

My summary of the performance of the AVCOMs (all three) is that they work uncommonly well. They are:

1) **More sensitive** than any other receiver we have tested here;
2) **More uniform** in performance than any other receiver we have tried out;
3) Have better control of color fidelity, hues, and sync parameters than other receivers we have had occasion to use here.

Now some detail. The AVCOM receivers currently in production have an "improved" signal level meter. The basic AVCOM has a front meter which you can switch between test and operate functions. In the operate mode, you are monitoring signal strength. Older AVCOMs, with a similar feature, were notoriously "damped" in the meter function; you had to move the antenna well off the satellite to see a recognizable excursion of the meter. No so with the current models; you can see variations in the 1/10th dB region, which for the non-technical is not very much. It is **as good as** the Washburn / Earth Terminal meter, which until now has been unbeatable. If you are into antenna alignment, having a sensitive meter that reacts quickly to small changes in antenna boresighting is very important.

The AVCOMs are now available so that you can remote-

Tired of VCO matching problems? Try the Avantek TVO-8370 in your TVRO receiver.

Available immediately. Easy-to-use Avantek components that are price/performance leaders.

It's easier to build a TVRO receiver system if you pick the right components—Avantek LNAs (Low Noise Amplifiers) and VCOs (Voltage Controlled Oscillators).

Our TVO-8370 VCO for TVRO systems gives you precise tuning from 3.6 to 4.2 GHz with an input voltage of 15 volts maximum. Our AWC-4200 series LNA bolts directly to your dish and provides "sparkle-free" input to your receivers. And our economical GPD amplifiers in TO-12 packages are perfect for IF gain stages.

TVO-8370—Excellent load isolation and improved FM noise performance.

The Avantek TVO-8370 has been designed for better load isolation using increased output padding. This means you won't encounter the complex, frustrating matching and VSWR problems that cause frequency skipping as you vary the tuning voltage on other oscillators. Avantek has a full range of oscillators with excellent single sideband noise performance for use with single-, double-, or block down-conversion systems. FM noise for the TVO-8370 has been improved by 10 dB.

Avantek oscillators for TVRO systems

Model	Frequency Range	Tuning Voltage	Output
VTO-8060	600-1000 MHz	1 to 50 V	10mW min
VTO-8090	900-1600 MHz	1 to 60 V	10mW min
VTO-8150	1500-2500 MHz	1 to 60 V	10mW min
VTO-8240	2400-3700 MHz	1 to 40 V	10mW min
VTO-0476	2600-3100 MHz	1 to 15 V	10mW min
S080-1564	2800-3400 MHz	1 to 15 V	10mW min
TVO-8370	3600-4200 MHz	1 to 15 V	10mW min
VTO-8360	3600-4300 MHz	1 to 30 V	10mW min

The LNA from the industry leader.

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To find out how quickly you can put these price/performance leaders to work in your receiver, call (408) 496-6710, or write Avantek Inc., 3175 Bowers Ave., Santa Clara, CA 95051

Avantek

mount the 4 GHz to 70 MHz IF downconverter; at the antenna. Bob Behar tells me that he can "see" a half dB or so improvement in carrier to noise when the downconverter goes at the antenna. I can't see where it will hurt things, and having a way to get rid of expensive hardline (by running inside at 70 MHz) is certain to be important in many installations.

6.2 and 6.8 audio is standard. On our out-of-production double conversion unit we had Andy stick in 5.8, 6.2, 6.8 and 7.4 MHz audio. That gives us COMSTAR audio plus Ghorizont audio on top of the common US domestic stuff. You can possibly talk him into more than two if you need it.

The AVCOMs have always had a "Scan Tune" feature. In this mode the receiver cycles through all of the channels, 1 through 24, and then starts over. This is useful if you are looking for a bird since it frees up your hands to move the antenna.

The AVCOMs have a pair of video outputs (one in a UHF connector, another in an RCA jack), and, a single audio output. The current single conversion units have a pair of audio pots; **one** for **each** of the two sub-carriers that are standard. You select which audio (or both if you can figure out why you'd do it that way) by simply turning up on the pot. They are available with the channel selector knob on the front panel, or, with the channel/transponder selector and audio controls in a remote package connected to the receiver with a length of 8 conductor cable.

So it is a good receiver. **Perhaps**, the best around. But, it is quite an expensive "box", and is it **that much better** than others in the same general price range?

We think so, but we do not judge any of our three units quite perfect yet. Yes, we have a few comments to make:

1) The box, while handsome, is **far too large** for the marketplace. I cannot expect many others to understand my passion for rack mounting units so I will not preach that one. But this is a box that is about 50% larger than it has to be. I believe Andy and Pat thought, early on, that size has to be included in the buying decision; that people would "feel" more comfortable spending AVCOM kind of money only if the box was humungous. I think they should re-evaluate that approach. Big is not always beautiful (although it does look good). And big is certainly a pain in the neck to fit into a decor! I'd suggest that **if half** of their sales are the remote controlled units, **now**, they should reconsider redesigning the box to a smaller package. Because that tells me most people are sticking them away out of sight anyhow. I know **we** had to build new, special shelves to fit our AVCOMs into our station decor.
2) We had one technical problem. A minor one. The second receiver had a video "glitch" when we peaked the fine tuning control for best picture; horizontal lines across the screen. It turned out to be nothing more than too much video gain in the video amplifier; something we diagnosed in a few seconds and corrected by turning down a pot inside of the big box.
3) In one of the units, when you switched the rear panel toggle from "test" to "normal" we saw a sudden and noticeable decrease in video picture quality. That should not happen, and while you don't or should not run it in the test position anyhow, **if** this is happening, somebody someplace **is going to forget** and leave the switch in the wrong position. And performance will suffer.
4) AVCOM tells you the video output level will be 1 volt peak to peak, and the audio will be around 0 dBm across 600 ohms. We found the video level uniformly "on". We found the audio to be "hot" on all three receivers. Hot is not bad, since there is a volume control on the receivers. But it is not quite spec either.
5) We would like to see the audio outputs on the current run modified plus **still have** a priority of the two out of a **third** output. In fact, having fully tuneable audio, from 5.0 to 8.0, would be a nice feature provided you also had the presets

available to you. The "world" is no longer "locked up" on 6.2 and 6.8 MHz; a fact I am sure Andy Hatfield is cognizant of.

6) The use of a UHF type connector, for the second video output (having two **IS** a good idea) seems a little "dated". While this type of connector is perfectly adequate for video, it is not compatible with anything else you are likely to have around the shop, home or station. RCA on both would be better; BNC on one and RCA on the other would be better yet. But keep the pair; it saves us having to feed a video DA sub-amp for our purposes!

As I finish this report, my "country" is watching Monday Night (ABC) football, from ABC. They are watching it through an AVCOM receiver fed by a DEXCEL 85 degree LNA and a HERO 20 foot dish focused on Westar 1. The picture is as good or better than you are watching from your local ABC station in your living room.

It has taken one heck of a lot of technology to get that picture into the living rooms and shanty huts of the Turks and Caicos Islands. Andy Hatfield has contributed to this effort and he is to be saluted, along with Pat and the staff, for bringing 20th Century technology to the outback of the Caribbean...and the world. Good job you two; keep it up!

CONTEST/ CONTEST

STRATEGY

Last month we announced a contest for satellite enthusiasts. One with a long (and growing) list of prizes for the winners who brave the rigors of a 48 hour "contest period" to come out in the top spot in their entrance category. A summary of the categories, and what they mean, appears here.

Some readers will have a "leg up" on the psychology of contesting life because of their amateur radio backgrounds; a "hobby" where "contesting" is an (optional) activity. Lacking that background, you may be wondering why **anyone** would even get involved in such an event.

In amateur circles, the spirit of competition is keen. You may have heard of something called 'DXing"; that's a part of amateur radio. It simply implies that the enthusiast wants to prove his skills, and the capabilities of his equipment, by reaching out and making contact with some rare or distant station. There are a few countries in the world where, for example there is but one or perhaps two licensed radio amateurs. Against this one or two chaps are the balance of the amateurs of the world; now numbering well over one million. Let one of these "rare (amateur) countries" appear on the radio airwaves, and bedlam breaks loose. Everyone wants to talk to this poor chap, who is probably transmitting with an antenna strung between two palm trees (or two mud huts) while a helper is outside turning a hand cranked generator to provide power!

Amateur radio contest are competitive, and very popular. **And there are no prizes.** At least none that have cash value.

You get certificates, and recognition, if you best the rest. There are "no prizes" in amateur contesting, largely because amateur radio is supposed to be (by law) an experimental communications service providing no direct compensation to its followers. Thus the word "amateur" - one who toils, without pay.

Yet many of the "contests" attract more than 10,000 participants worldwide! Contesting, for some ham radio operators, is a strong motivation and an important part of their amateur activities.

Having said that, what does it have to do with a "contest" for satellite TV enthusiasts? And how could it have any chance of helping you out with your (possible) business interests in this field?

EQUIPMENT COMPARISONS

One of the primary concerns of all who are part of this evolution of satellite hardware is the quality of the equipment we select to install and use. We all **know** that some equipment **is better** than other equipment; but which equipment is which?

A contest starts to sift that out for us. Use of equipment, during a concentrated contest activity period, is tough. Antenna feed rotators rotate more often; antenna mounts move more often; receivers get tuned from channel to channel more often. A 48 hour contest period could easily telescope a year's normal use into a weekend! Participants will tell us how their equipment "held up", and in our reporting on the contest activity, we'll tell you what they say.

Some participants will find out their LNA was not as good as it might have been, or their receiver was not as sensitive as it could have been. If all of the **winners** end up in the tally using "XYZ" receivers, there will be a message here which will creep into the reporting in **CSD**.

Antenna systems, for those who elect to participate in the move-able antenna classes, will get the toughest assignments. Motorized antennas in particular, will be hard pressed to keep up with the constant back and forth movements that one can expect to see over a concentrated 48 hour period. Those that break down will tell us something. Those that do not will tell us even more.

OPERATIONAL CONSIDERATIONS

The proliferation of satellite services, both real and imagined, sweeps us all up monthly. Each new announcement of any type of programming service opens a new avenue for equipment sales for the local dealer. Learning, for example, that the Morman Church is now starting to make widespread use of satellite interconnection suggests that a new local point of sale is the local church.

Audio (narrow band) services are especially interesting for the new sales potential they bring. Even the most remote areas have a few local AM radio stations; and there are now more than a dozen audio/narrow band commercial programming services available on the various birds. Hard knowledge, a familiarity, of such services better equips **you** to explain them to a local radio station client for a new terminal.

A concentrated observing period, spread over a weekend, is not the best or ultimate indicator of the level of such services; but it is far better than being inundated by the barrage of new service announcements that appear in **CSD** and elsewhere monthly, since most are quickly lost in the shuffle of new announcements in following months. Very few of the new services stick "out" like CNN or the Music Channel; most must be re-discovered several times before they stay with you.

THE PRIVATE INTEREST

Commercial uses of the many satellite services aside, many enthusiasts who own their own terminals are simply "curious" about the varied services found on satellite. But they are single observers with only a limited amount of time to observe, and a limited capacity to absorb all that is offered to them. A "mass observing period" helps to focus everyone's individual attention on specialized services, which often escape notice in the day to day routine use or observation of satellite data.

There is, therefore, "something for everyone" in the concept of a contest. From the results, to be published in **CSD**, and from the observations, to be published in a comprehensive reference manual on observed satellite acitivities, everyone in the industry will benefit and profit.

CONTEST CATEGORIES

There are five entrance categories available to you as a satellite enthusiast. You may be equipped for a "higher class" than you choose to enter (i.e. a person with a motor driven dish may **elect** to participate in a fixed dish/single bird category).

Each category has its own set of prizes. **National Microtech**, for example, has agreed to donate five LNAs so that the winner of **each category** will have an LNA to go with his other list of prizes! There are receivers, antennas, and to the winner of the special "Sprint" category, a $4,000 projection television receiver. This is no small stuff activity!

Category One - Fixed Dish (Single satellite) / your dish must **stay** on a single satellite for the full contest period. Any satellite (your choice).

Category Two - Manual Dish Movement / your dish can move, but you have to move it by pushing or shoving, or turning on a crank. All dish moving to be by "human / man power". You get to move around the birds to pick up different "feeds".

Category Three - Motor driven dish movement. You sit at your receiver and direct the antenna from satellite to satellite. This puts you in the "top class", with maximum flexibility for logging feeds.

Category Four - Outside North America. Your terminal is located outside of North America (US, Canada, Mexico), plus Bermuda, and the Caribbean from the American Virgins west. This places you in a category where your competition is others who are similarly located. And you are, for the most part, outside of the "reach" of the concentrated North American DOMSAT birds. Note: If you have any question about fitting into this category, contact **CSD**.

Category Five - "Sprint". The full contest period lasts 48 hours. BUT - early in the contest there will be a "three hour sprint" during which you will try to "log" as many feeds as you can in a concentrated effort. The winner here **could be** a winner in any of the four other categories, or, it could be a "short termer" who really has his act together, electing to go for the "big prize" (the $4,000 projection system from Hoosier Electronics) in one hectic spurt.

This reminder. Each entrant wil need to submit, with the contest entrance forms, a decent photo of him or her self standing near, along side of or whatever...your satellite terminal antenna. Official contest entrance forms will be available from **CSD** well in front of the contest proper.

WHEN? HOW?

The actual weekend dates for the contest are yet to be selected. The period in February/March is a likely candidate. An operational F3R, if that happens, will play a key part in the decision to select an appropriate weekend.

How each participant will compete against others in his classification was suggested in our October report. We can suggest some approaches you may wish to consider, however, as we wind towards the actual contest period.

1)**Narrow band versus wide band** - One of the more

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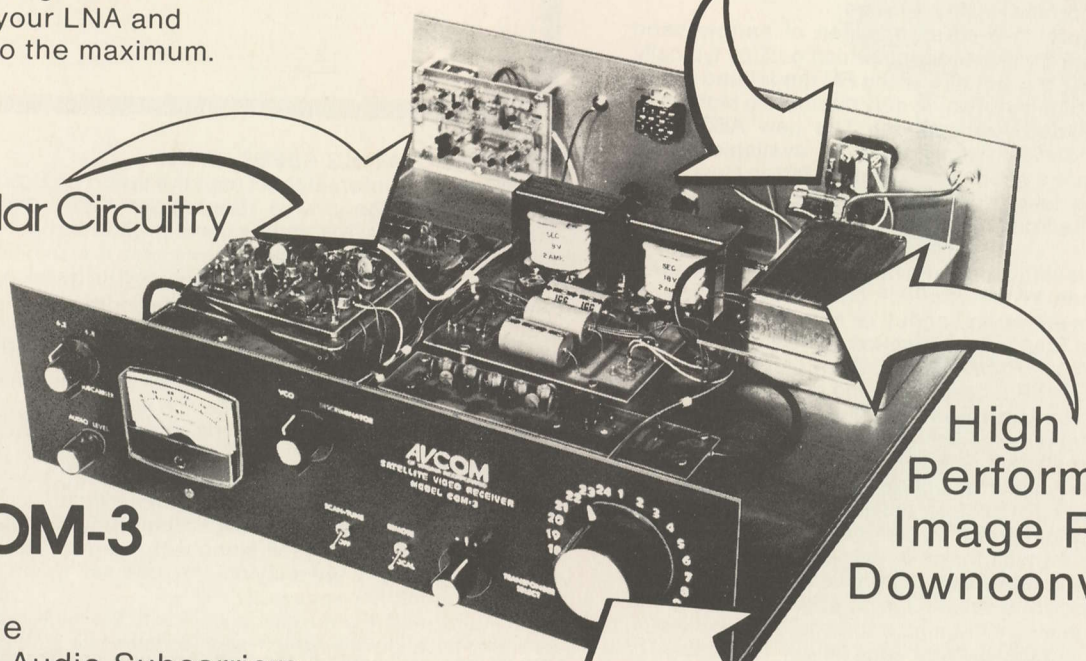

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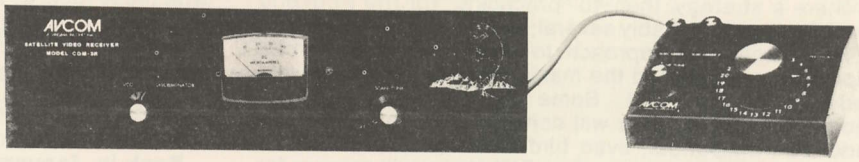

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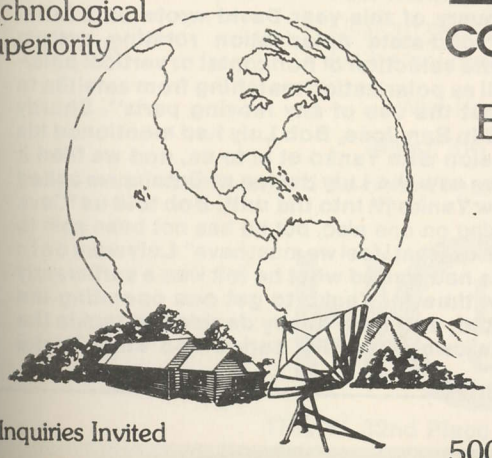

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perplexing "tactical" decisions to be made involves just how each contest participant will align his available time to observe the various types of services available.

We mentioned in October that for a contestant to be truly competitive, having the ability to observe narrow band signals could be crucial. At this point in time we do not believe equal "contest weight" should be given wide band (video) and narrow band (audio, data) signals in the contest point tally column. On the other hand, since well over 1,000 narrow band channels can fill a transponder in lieu of a single wide band signal, it would not be right to require observers to "log" an equivalent number of narrow band signals to equal the contest points granted for a wide band signal. Some happy, but workable compromise, will be found.

There are actually two different types of narrow band signals; the true narrow band signals which occupy typically less than 4 kilohertz per signal, and the FM modulated wider-band "narrow band" signals which may number no more than 16 on a fully "loaded" transponder. The new ABC radio network news and music services, to be available during 1982 on Westar, are a good example of the latter. How many of these it should take, to equivalent a wide band signal, must also be worked out.

An equally perplexing problem is raised with the occasional video service feeds. When you lock onto F1, and each (or most) of the users are operating full or near full time on the same transponder for a full observation period, logging then becomes a matter of "catching each once" and then moving on. But what about the feeds that come and go, often with great irregularity, on the **non** cable birds? Should contest point credit be granted for each individual program feed, or only for each uplink "transmitter" in use? Those who would suggest that each uplink transmitter makes the most sense, since it represents a distinct user of the satellite, immediately are faced with a bigger problem; the observer often does not know what uplink transmitter he is watching.

Since the real long term value to all of us is to zero in on the many **types of program formats available** to users of the satellites, it then makes more sense to us to allow individual contest credit for each distinct feed seen, regardless of where it may come from. If NBC stacks the evening programming on F2, TR8, and the schedule from 8 PM to 11 PM plus the Johnny Carson Show from 11:30 to 12:30 (AM) runs, **that's a feed.** But if over on Westar there are several different shows or portions of shows fed on a single transponder in the same time frame, and they are not related to one another except by virtue of having used the same transponder for "feed", each would count as individual (and separately towards point total) loggings.

Is there a strategy, then, to "practicing" for the weekend event? There are probably several; each of the five "winners" will have their own approach to maximizing the contest period and to log or find the maximum number of separate "feeds" during the event. Some will not sleep for the full period (48 hours). Others will constantly move from transponder to transponder, even bird to bird, looking for new "feeds" that may have popped up. Still others will prepare for the event by spending hours searching out the "pattern of feeds" in the weekends prior to the actual contest; hopeful that by doing this they will be able to more quickly "identify" those they do see in the contest period, and "move on" to the next selection available.

We'll let you in on this. Each feed "logged", that is, entered on your contest entry form, must be **positively identified** as to the source of the feed. That means you may have to stay with a feed for quite some time to pin down "who it is" that is providing the feed. And that may separate the winners from the also-rans. The chaps who do the best may turn out to be those who are quick to recognize, and identify, the sources for the feeds they see...so they can move on to "log another one".

TECHNICAL CORRESPONDENCE AND NOTES

ORIGINAL ROTATING FEED?

It was with great interest that I read the report on Bob Luly's polarization rotation device (September **CSD**); from the Omaha SPTS. I believe I may be able to shed some light on the evolution of this device. The system and the principle by which it functions has been in extensive use in the microwave industry for many, many years.

I am enclosing a product specification sheet from a TRG catalog which is several years old. Historically, the main problem with this type of device has been that it has relatively high losses. For this reason the device was never used very much for earth station applications, which require high system G/T (figures of merit).

Reaching back to my own involvement with this particular device takes us back to the San Jose SPTS event, at which I first met Bob Luly. One evening's dinnertime rap session consisted of Bob and myself along with Norm Gillaspie and John Rohner. We were playing the popular game called "What this industry needs is...".

Bob mentioned that during his work with the military he had worked with a device which was a magnetic polarization rotator. He suggested that it would be a real assist to the TVRO terminal. I became intrigued wiht this idea and discussed it at great length with Bob. Then I came back to Cleveland and spent the better part of the next six months working all of the inherent problems out of such a device. By the start of 1981, the device was in prototype form and working very well. Each time I have met or talked to Bob since then, we have continued our discussion concerning the device, and I have kept him appraised of our progress.

I would appreciate it if you would correct the discrepencies with these facts as it applies to your report in the September **CSD**.

David J. Yanko, President
Tri-Star General, Inc.
4908 Van Epps Rd.
Cleveland, Ohio 44131

Back in January of this year David wrote us a letter outlining a "solid-state polarization rotating system which allows the selection of horizontal or vertical polarization, as well as polarization matching from satellite to satellite without the use of any moving parts". Shortly after the SPTS in San Jose, Bob Luly had mentioned his dinner discussion with Yanko et al to us, and we filed it away. When we saw the Luly device at Omaha we asked Bob about how Yanko fit into the unit. Bob told us "Dave has been working on one also, but he has not been able to achieve the low loss that I feel we must have". **Luly went on to explain that he had waited what he felt was a sufficiently long period of time for Yanko to get one operating the way Luly wanted, and then finally decided to tackle the project on his own. The TRG series 145 units Yanko**

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mentioned are available in 8 models; they start at 12.4 GHz and go up to 110 GHz. None cover 3.7 to 4.2 GHz. We would guess the price is in the kilo-buck region, and the loss is .5 dB. Dave is to be remembered for contributing to the device's development but Luly it appears will be remembered for making it work and **bringing it onto the marketplace.**

GOOD SHOW

I wanted readers of **CSD** to know that there ARE some good equipment suppliers in this field. First, Bob Luly and his Umbrella Antenna. After getting it home and setting it up, it only took me five minutes to find F1 from **inside** of my living room. Second is Clyde Washburn. I bought one of his receiver kits from Ramsey; way back when they were first introduced. It went together without too much difficulty, but the PLL oscillator chip failed. Working with Clyde I got a new chip and the system produced pictures.

Ths system was initially installed in the living room of my condominium. The antenna was too large to go on the balcony, so it had to look **through** the roof (1.5" pine, 1.5" asbestos, 15 pound felt, tar and gravel). The system produced watchable pictures on the odd (vertical) transponders but the even ones were exceptionally weak. Of interest, the grain of the pine in the roof was horizontal.

I recently moved to a house and the antenna went out into the backyard. I then discovered the condo roof was good for between 6 and 10 dB of "attenuation" at 4 GHz and the system now works well on all transponders. The antenna is very easy to move from one location to another or reposition to other satellites. The antenna is tied down, and wind has not been a problem. Again my thanks (and congratulations) to a pair of very straight forward suppliers that have been enjoyable to work with and who produce a very excellent product.

Paul Thompson
6519 Cleon Av.
N. Hollywood, CA 91606

Egads. Inside no less! **Fascinating. If one were to add the extra 2 to 3 dB of signal level you can find in the midwest to your numbers, the prospect for** inside reception **begins to look very intriguing. There is no reason why**

someone building a new home (we know - who can afford to do that now!) **could not locate a clear skylight in the appropriate roof position to allow a low loss "look" at a portion of the bird belt. The "risk" here is that as the bird industry matures, you'll end up with a "window" looking at a bird that used to carry good video, but sometime in the future switches to non-video product. Thanks for the input Paul; good stuff!**

HAM NET ALIVE

I believe an ARRL type of Handbook, covering every possible part of the satellite receive terminal, is a good idea. There are many many small projects that even the semi-experienced electronic experimenter could build and make work. A tuneable audio system, for example, for 5.5 to 8.5 MHz is a good one. I recently received a copy of a circuit from W5JG in New Orleans explaining a new way to do this. The satellite enthusiasts ham net, meeting each Sunday at 2 PM eastern (daylight or regular) on 14.311, is still alive and well.

James Burkett K5IZH
Route 6, Box 514
Enid, OK 73701

We listen in every now and again on the Ham Net but while we hear **most everyone quite well we haven't made our presence known since arriving in the islands more than a year ago. We are going to suggest,** on the net one day soon**, that when the F3R bird is finally in position and ready for check out that we use the 14.311 frequency to share** "early reports" **on F3R (vs F1) apparent service coverage. This is one way those of us who are hams can get a head start on the rest who will be watching the activation of F3R with interest. Watch for** VP5D **to check in fellows!**

SCHEDULES?

I recently put in a 12 foot dish and am now in the progress of putting the dish to good use. I have a couple of questions:

1) How can I find the **programming schedule** information for the other satellites that are not listed in Sat-Guide (i.e. Westar 1, Anik, etc.)?
2) I would like to know more about the nature of the **non-NTSC signals** on the satellites. Slow-scan, audio only, graphics, data and so on intrigues me but I cannot find out

much about it.

3) I believe that given the **threshold of a receiver** (such as 8 dB), the noise figure of an LNA (such as 1.5 dB), and the gain of an antenna (such as 41 dB), you can determine at least roughly what the minimum EIRP signal must be to establish full quieting. If this is true, can you give me an equation to calculate this factor?

Ron Graham, Jr.
Box 63
Essex, MA 01929

Any of the NON-CABLE services on satellite (NBC Green Network on F2, CBC North on Anik, ABC news feeds on Westar 3 and so on) are not **available in any printed guide, anyplace. And for good reason. With few exceptions** (Anik is the prime exception) **the programs are** not scheduled. **They may appear to be pretty set as to time and day and transponder, but the program or satellite operator has the right and ability to change the "feed time" as well as the transponder number** (and even the bird) **with no notice. They exercise this "right" daily. Users, such as CBS/ABC/NBC** (to pick on three) **contract for a service. That service is the transmittal of a specific program** (such as "CBS Sunday") **from one place to another. They "hand" the program to the common carrier in New York, at their headquarters, and then the carrier transmits the program to the destination, where it is handed** back **to the program service. The carriers, such as Western Union, have the option of putting the program on any transponder and any of their satellites that is available at the time. Certain groups of channels are usually set aside for east-west** (i.e. New York to LA), **and west-east transmissions, but beyond that it is catch as catch can. The best treatment of non-video signals is found in** Coop's Operations Manual", **available from STT. We are looking for additional material to print on the subject but so far only Steve Gibson** (see article this issue) **seems ready to share data.**

GRIPE

I almost did not renew my subscription to **CSD**. I subscribe to **CSD** to find out how good the equipment is, and who makes the best equipment. Therefore, I was very disappointed when you did not identify the various antenna manufacturers involved in the Omaha tests. I called a number of the antenna people and no one would admit what their "number" was. Obviously, I did not talk with any of the "winners".

Robert L. John, President
Probity Enterprise, Inc.
Blain, PA 17006

Let's not overlook the conditions of the Omaha tests. They were as "pure" as the mechanics of the situation could allow. But they were not perfect. Plus, many of the antennas could not be outfitted with the "test jig". Most of the people who really cared, and who were on hand during the test, had the winners and losers figured out within 30 minutes of the announced results in Omaha. When we do it again, perhaps next summer's SPTS, we'll try to figure out a better way to do it. In the interim, we are open to any and all suggestions as to how to improve the technique.

DOMSAT IN BRASIL?

I am located at latitude 22 north and 45 west; in the state of Sao Paulo. I purchased and received from Satellite Computer Service in Las Cruces, NM a print out for receiving signals at my location. According to this data (copy enclosed), it appears that we **can receive** medium to good signals from three birds; Westar 1, Comstar D2 and Comstar D3. However, I belive other information may be required. I also understand that in the southeastern USA, and in the Caribbean, reception from these sources is not good; so wouldn't our location down here

in Brasil be even worse?

Could I realistically expect to receive these signals with the Spherical Antenna described by Hayden McCullough in the current issue of **Radio-Electronics** magazine? What type of LNA and receiver would I need to use?

Barney Blackburn
Caixa Postal 33
12.120, Tremembe, Est. de S.P.
Brasil

Unfortunately, the computer service you used tells you only **whether or not a satellite, sitting above the equator at various locations, could "see" you** (or be "seen by you"). **It does** not consider **whether the satellite in question is looking at you; i.e. whether it transmits any signal in your direction. None of the US** (or Canadian) **DOMSAT birds** look at **Brasil. They do not even come close. So while they can be seen, that is you have a clear** visual **shot on them above your horizon** (local conditions permitting), **the satellite's hind end is pointed towards the south** (and Brasil). **No signal squirts out of the hind end; only the front end.**

In the eastern coastal region of Brasil there are at best a handful of satellite video services available. None come from North America. **There is the tried and true Ghorizont signal at 14.5 west, Intelsat's at 24.5 and 40 degrees west. That's it. Between them, with a 20 foot dish and good electronics, you'd have one channel of Brasilian TV, one of Argentine TV, one starting up for Columbia plus between 1 and 5 channels of European TV via Ghorizont. But Mork and Mindy will not be there!**

HANDBOOK SUGGESTIONS

I have the following suggestions for a HANDBOOK for satellite reception:

1)High quality modulator circuits (not the LM1889 device);
2)Tunable audio boards with stereo capability;
3)Inexpensive homebrew antennas (parabolic and spherical);
4)Simple digital circuits to decode various types of teletext;
5)Antenna positioning programs and equations so the enthusiast can locate all of the birds from his location;
6)PAL and/or SECAM conversion to feed NTSC monitors or TV sets.

E. G. "Glenn" Bultmann

We have been asking our "Pioneer" subscribers for input on what type of information they would like to see in a massive "Satellite Users Handbook" we have begun work on. Many of Glenn's suggestions hit-home for technical features in CSD **as well. Anyone out there who has experience in any of these areas, and who wants to share information?**

ASIAN OLYMPIC GAMES

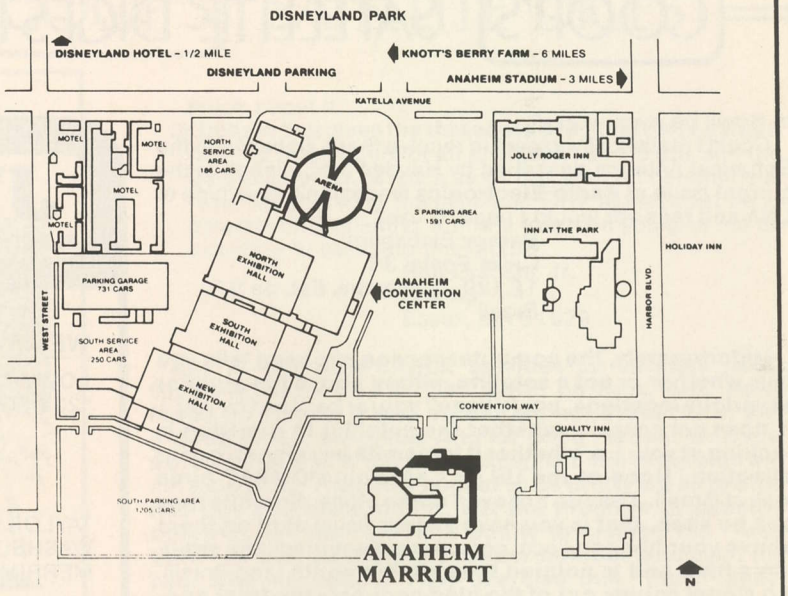
There is a possibility of our working something out to use the Indian satellites to transmit the Asian Olympic games to be held in India in 1982. Anyone who is interested in working on this project, as well as getting the coverage to other sections of the world via satellite, is asked to contact me as well as: Shreedrauash Agarwal, Conecita Private Ltd., 1076 Dr. E. Moses Rd., Worli, Bombay, 400018, India.

S. R. Iyer
Bombay Holding Company
51 East 42nd Street
New York, NY 10017

Good project.

SVS '81 ANAHEIM — BE THERE!

THE NEXT SPTS WILL NOT BE IN ANAHEIM CALIFORNIA



BUT THE FIRST SVS WILL!

SVS - That stands for Satellite Video Show. An exciting new concept tailormade to the exciting Southern California / Western USA marketplace where video is a passion and a way of life. Staged by STTI (the same folks who just brought you the exciting Omaha SPTS), the world's first **SATELLITE VIDEO SHOW** will bring the best of both exciting new entertainment worlds into focus at one place, at one time.

ANAHEIM, CALIFORNIA - November 20-21-22. In a location that will set new standards for family fun, convenience and a super opportunity to see why satellites plus the revolution in video go hand in hand in the marketplace! Right next door to the attractions that have made Anaheim one of the entertainment and family fun centers of the world. Three full days of satellites, big screen video, tape video storage and tape systems...the whole world of **21st Century Video**, all rolled into one place at one time. The "natural marriage" of satellites, as a video **delivery** system, holds the spotlight for all of the exciting new video storage and display equipment.

THE VIDEO STORE of the future will "marry" the natural program selection ability of the satellite delivery system with the big screen advances which have paralleled the recent advances in home satellite terminal technology. **SVS '81 ANAHEIM** brings it all together in the most advanced, futuristic and receptive "video marketplace" in the world; Southern California! If you make, or sell retail video equipment of any type, this is **THE SHOW** for you!

A SATELLITE SHOW as never before; "Big Screen Viewing Islands" located conveniently throughout the huge exhibit floor so attendees can browse the exhibits **AND** attend lecture sessions and special programs simultaneously! The exhibit hall becomes the main stage, the center **of all** activity for three full days. Attendees can attend lectures **AND** see exhibits without ever leaving the exhibit hall!

TREMENDOUS PUBLICITY throughout all of Southern California. A program featuring the leading personalities in home video, satellite video and the communications revolution. Southern California is always on the "leading edge" of new life styles and technology. SVS will be there to bring it all into focus!

PLAN TO ATTEND SVS '81 ANAHEIM now. Register early to be assured that you will find room at the SVS '81 Hotel, the brand new Anaheim Marriott. Use the registration form appearing in this issue. **Today.**

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The SR-3 Satellite Receiver . . . once again, more of the performance, features, and convenience you've come to expect from KLM. Handsomely styled cabinet outside, state-of-the-art single conversion circuitry inside. Install the SR-3 up to 1000 feet from the dish; a single 50 ohm feedline makes it clean and easy. Select KLM's separate remote downconverter or the revolutionary "Ampliverter" that combines LNA and downconverter in one very compact package. And, enjoy these easy-to-look-at/easy-to-use features:

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- Positive detent channel tuning plus fine tune
- Full audio tuning/stereo version available
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The SR-3 with remote downconverter or Ampliverter is available NOW, just like KLM's new motorized dish systems with remote "Moto-Trak" control. More of the best from KLM.

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- FIRST To Ship the Innovative Divide By 2 PLL
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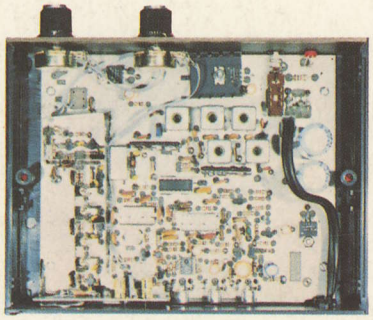
The Sat-tec R2B receiver is our latest full feature receiver, tailored to commercial equipment specifications at a price you can afford. the R2B's single board construction eliminates problematic interconnections and innovative utilization of all components results in a reliable and proven design. Operation is simple—a single tuning knob does it all, and our unique Channel-Lock AFC keeps the tuning sharp and accurate. A new feature is our variable audio tuning to give you complete selection of all subcarriers—without the use of additional plug-ins or devices. This, together with the R2B's full frequency coverage makes it truly compatible with all domestic and international satellites.

For superior value as well as lowest system cost, the choice is but one—the R2B! See your dealer today or write to us direct.



SPECIFICATIONS

Frequency range:	3.6-4.3 GHZ tunable
Audio range:	5.2-7.6 MHZ tunable
Threshold:	8db CNR
IF bandwidth:	30 MHz for full fidelity video
LNA power:	15 volts regulated for up to 2 LNAs
Outputs:	Standard one volt audio and video, compatible with VCRs, monitors and modulators
Optional:	BC-1 RF modulator kit, tunable channels 3-6 with sound

Sat-tec Systems
div. Ramsey Electronics, Inc., 2575 Baird Rd., Penfield, NY 14526, 716-586-3950